ROYAL COLLEGE OF DENTAL SURGEONS of ONTARIO

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THE

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CONDUCTED BY

J. EDW. LINE, D. D. S., M. D. S.

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THE

Odontographic Journal.

VOLUME VII.—*April, 1886.*—*No. 1.*

ANNUAL DINNER OF THE NEW YORK ODONTOLOGICAL SOCIETY, 1886.

On the 5th of January, the following announcement was sent to every "Resident," "Non-resident" and "Honorary member" of the Society:

NOTICE.

To the Members of the N. Y. Odontological Society:

The Annual Dinner for 1886 will be given at the Hotel Brunswick, on Wednesday evening, February 10th, at half-past six o'clock.

The Society, on this occasion, will be honored by the presence among its guests, of an unusual number of eminent men from other professions and from public life.

Members desiring to be present, will please give early notification to the Chairman of the Entertainment Committee.

By resolution of the Council of the Society, "members are entitled to personal guests upon sending the names of such guests, together with the price of the dinner ticket *for each guest*, to the Entertainment Committee."

Upon the receipt of such names and the amount, ($10. each), the regular invitation to guests will be sent to the persons named.

Members finding it necessary to cancel an acceptance, should so inform the committee by note at least one day preceding the dinner, in order that the tables may not be disarranged, and *the Society put to unnecessary expense.*

NORMAN W. KINGSLEY,
C. A. WOODWARD,
A. H. BROCKWAY.
Entertainment Com.

25 West 27th Street.

Certain responses were received, which showed that the "Notice" was not distinctly understood, and the following card was immediately issued:

To Members of the N. Y. Odontological Society:

In spite of the best efforts of the Committee to make the announcement of the Annual Dinner explicit, the question has arisen, "if members are to pay for their dinner."

The answer is, ALL the Members of the Society are entitled to seats without expense.

For *their personal guests only*, they reimburse the treasury.

NORMAN W. KINGSLEY,
Chairman Entertainment Com.,
January 8th, 1886. 25 West 27th Street, New York.

With the approval of the Council, the Committee issued a hundred "invitations" to guests, in the following form:

The Annual Dinner
of the
New York Odontological Society
for 1886
will be given at the
Hotel Brunswick,
on Wednesday evening, February tenth,
at half past six o'clock.
The Society will feel honored by the presence of

among its guests on that occasion.
An early response is requested.
Norman W. Kingsley,
Chairman Committee, etc.,
25 *West 27th Street.*

This invitation was sent to distinguished representatives of Dentistry, Medicine, Literature, Law, Theology, Journalism, Politics and the Arts.

The Committee received a response to nearly every invitation, and when it carried a "regret" it was always accompanied by a tribute of respect for the Society and the profession which it represented.

The dinner was spread in the "Banqueting Hall" of the Hotel Brunswick, upon five tables, three long ones running lengthwise of the room, and two crossing, one at each end. The President of the Society, Dr. E. A. Bogue, occupied the centre of the short table at one end of the room, and Dr. Kingsley, Chairman of the Committee, was his *vis à vis* at the other end of the room.

The following is a list of the guests, arranged alphabetically and irrespective of their places at the tables :

Prof. R. R. Andrews, Cambridge.
Dr. Wm. H. Atkinson, New York.
Dr. Geo. S. Allan, New York.
Dr. W. W. Allport, Chicago.
Dr. Chas. F. Allan, Newburg.
Prof. Frank Abbott, New York.
Dr. T. F. Allen, New York.
Fordyce Barker, M.D., L.L.D., N.Y.
Rev. A. F. Beard, D.D., Paris.
Dr. W. Geo. Beers, Montreal.
Dr. Chas. Brewster, Montreal.
Prof. T. H. Brophy, Chicago.
Dr. A. H. Brockway, Brooklyn.
Dr. E. A. Bogue, New York.
Dr. W. A. Bronson, New York.
Prof. C. A. Brackett, Harvard Uni.
Ernest Burt, M. R. C. S., Paris.
Dr. C. R. Butler, Cleveland.
Dr. S. L. Benson, New York.
Dr. C. L. Browne, New York.
Dr. J. Adams Bishop, New York.
Rev. Howard Crosby, D.D., N Y.
Dr. J. N. Crouse, Chicago.
Dr. F. Y. Clark, New York.
Dr. J. W. Clowes, New York.
Dr. Wm. Carr, New York.
Dr. Chas. D. Cook, Brooklyn.
Gen. Jas. F. Dwight, Mass.
Dr. Wm. H. Dwinelle, New York.
Dr. J. Smith Dodge, Jr., New York.
Prof. E. T. Darby, University of Pa.
Dr. A. M. Dudley, Salem.
Dr. Daniel Dwyer, Hartford.
Mr. D. F. Davenport, New York.
Dr. S. E. Davenport, New York.
Dr. W. F. Davenport, New York.
Dr. Chas. E. Francis, New York.
Mr. W. Hildreth Field, New York.
Prof. Jas. E. Garretson, Phila.
Dr. James Goodwillie, New York.
W. A. Hammond, M.D., L.L. D., N.Y.
Prof. Carl Heitzman, New York.
Dr. J. Morgan Howe, New York.
Dr. Henry C. Houghton, New York.
Mr. Theo. I. Husted, New York.
Dr. J. C. Hutchinson, Brooklyn.
Dr. J. F. P. Hodson, New York.
Dr. Wm. E. Hoag, New York.
Dr. Eugene F. Hoyt, New York.
Dr. F. Hasbrouck, New York.
Dr. A. C. Hawes, New York.
Dr. S. Hassell, New York.
Dr. Samuel F. Howland, New York.
Dr. S. B. Palmer, Syracuse.
Dr. O. E. Hill, Brooklyn.
Dr. Chas. F. Ives, New York.
Hon. Thos. L. James, New York.
Abraham Jacobi, M.D., L.L.D., N.Y.
Dr. Wm. Jarvie, Brooklyn.
Dr. Norman W. Kingsley, New York.
Prof. C. A. Kingsbury, Phila.
Mr. H. F. Kingsley, Mansfield, Pa.
Dr. Benjamin Lord, New York.
Dr. J. Edward Line, Rochester.
Dr. J. Bond Littig, New York.
Dr. Theo. Ledyard, New York.
Dr. Wm. T. Laroche, New York.
Dr. Arthur Mathewson, Brooklyn.
Dr. Thos. M. Markoe, New York.
Dr. W. Duncan McKim, New York.
Dr. James McManus, Hartford.
Dr. Charles Miller, New York.
Dr. S. A. Main, New York.
Dr. Chas. W. Miller, New York.
Dr. C. A. Marvin, Brooklyn.
Dr. H. G. Mirick, Brooklyn.
Dr. Chas. Merritt, New York.
Dr. Geo. T. Moseley, New York.
Dr. A. L. Northrop, New York.
Dr. E. S. Niles, Boston.
Dr. H. B. Noble, Washington.
Dr. Robert Ormiston, Brooklyn.
Gen. Horace Porter, New York.
Dr. Geo. L. Parmele, Hartford.
Dr. E. Treat Payne, New York.
Dr. S. G. Perry, New York.
Dr. John B. Rich, New York.
Dr. E. H. Raymond, New York.
Dr. F. A. Remmington, New York.
Dr. Jas. H. Race, Brooklyn.
Dr. Frank A. Roy, New York.
L. A. Sayre, M.D., L.L.D., New York.
Dr. Geo. F. Shrady, New York.
Prof. Thos. C. Stellwagen, Phila.
Prof. L. D. Shepard, Boston.
Dr. Newton M. Shaffer, New York.
Dr. DeForrest Smith, New York.
Dr. F. N. Seabury, Providence.
Dr. C. S. Stockton, Newark.
Dr. Dwight Smith, New York.
Dr. E. Todd, New York.
Dr. James W. White, Philadelphia.
Dr. Jas. L. Williams, Philadelphia.
Dr. Jacob L. Williams, Boston.
Dr. C. A. Woodward New York.
Dr. C. S. Wardwell, New York.
Dr. T. F. Wardwell, New York.
Dr. T. B. Welch, Phila.
Dr. C. P. Wilson, Boston.
Dr. W. A. Woodward, New York.
Dr. Geo. W. Weld, New York.
Dr. W. W. Walker, New York.

An interesting feature of the evening, was the distribution to each one present, about nine o'clock, of a handsome gilt-edged folded card, containing an accurate list of the guests.

The "list" was corrected and went to press after the guests were seated at the table.

The "Menu" was printed upon orange-colored satin, as follows :

NEW YORK
ODONTOLOGICAL SOCIETY
Annual Dinner,
1886.

MENU.

HUÎTRES.
Blue Points.

POTAGE.
Consommé Sebastiani   Bisque de Crevettes

HORS D'ŒUVRE.
Variès   Variès
Timbales frites Bressoises.

RELEVÉS.
Bass á la Royal.   Filet de Bœuf Balzac.

ENTRÉES.
Vol-au-Vent de Volaille, Champignons.
Ris de Veau, Choiseul.

LÉGUMES.
Pommes Duchesse.   Petits Pois au beurre.
Haricots Verts á l'Anglaise.

SORBET MONTMORENCY.

RÓTI.
Red Head Duck   Cailles au Cresson.
Celery Mayonnaise.

ENTREMENTS.
Pêches á la Richelieu.   Gelée Anisette.
Glaces Fantaisies.
Petits Fours.   Gateaux Assortis.
Pieces Monteés.
Fromages.   Fruits et Dessert.
Mottoes.   Café.

This dinner was a marvel of gastronomic skill, and served in the manner for which the Hotel Brunswick is justly celebrated.

At half past nine, President Bogue rapped for order, and delivered the following

ADDRESS.

Gentlemen, honored guests of the New York Odontological Society:

It becomes my duty, as it certainly is my pleasure, to extend to you in the name of this Society, our hearty welcome; and to express our appreciation of the honor conferred upon us, by your presence here on this occasion.

Among the gentlemen who have thus honored us, I see distinguished representatives from the medical profession, the church, the army and the bar, whose influence upon the social, political and scientific events in our country has caused their names to be known throughout the length and breadth of the land.

I had nearly included the navy in my enumeration, for until a few moments ago we had expected as one of our guests, our reverend friend, Mr. Beecher, who once took it into his head to follow the sea.

I happened to be upon the same vessel and he used to call me ship-mate, so I know whereof I speak—but the sea followed him—he grew sick—of his undertaking; he threw up—his engagements; he forgot the Sabbath; and declared that, judging from his feelings, it was only a "weak day." So the navy lost a brilliant member, and the Democratic party gained a mighty advocate.

From the navy, it is but one step to the man-of-war. It is, I believe, the general opinion, that they are steel, or at least iron-clad. This is a mistake, so far as the American variety is concerned.

The dentist has discovered that they are as vulnerable as anybody, and as "tender hearted as a woman." *We* often see the sympathetic tear spring to their eyes, when they are touched by some of our gentle ministrations.

We are delighted to see our medical friends, and are happy to get them away, even for a few short hours, from the grave subjects that generally occupy their attention.

Our legal friends will not expect us to usurp their prerogative, of free speech, so I return to my own craft.

Fifty years ago dentistry as a distinct calling was scarcely known. To-day, our fast growing civilization recognizes it as a necessity; the higher the civilization, the greater the necessity; ergo, the dentist stands at the head of modern civilization. No such gathering as this *could* take place among savages.

As surgery began in the barber's shop, so dentistry began *ex necessitate rei*, which means "necessary to extract the thing." But, this

Ishmaelitish existence, when every man's hand was against us, because our hand was against every man, came to an end as the years passed by.

When "the sound of the grinding grew low," and twinges of conscience, or some other inward monitor, reminded one and another of his duty toward us, men sought our society and paid their duties, some of them, though many who claimed our services would have preferred free trade. Little by little, like the great nations, through carnage and blood-shed, we learned the arts of peace.

We reach the culmination of our career, when we can venture to invite our friends to join us in a practical test of the quality of our work. We have not often indulged in occasions of this kind; because we sympathize with those unfortunates who might be invited, and who for prudential reasons would not have the temerity to refuse. But, this evening we have ventured; and I will ask Dr. Kingsley, as chairman of the entertainment committee, to conduct the further proceedings from his end of the room.

DR. KINGSLEY:—

Mr. President, members of the Odontological Society, invited guests, and goddesses in the gallery, if any there be: *

A story is told of a Kentuckian, who dined at the Governor's house one night and the next morning was met on the street by one of his neighbors, who said, "Colonel, who was dining at the Governor's last night?" "Well," said he, "there was myself; and besides myself there were several other distinguished gentlemen from Kentucky, two gentlemen from Virginia, a man from Pennsylvania, a fellow from New Jersey, and a son-of-a-gun from New York." Now, gentlemen, if any member of this Society should be asked to-morrow morning who dined with the Odontological Society to-night, he can say that, "Besides ourselves, we had several other distinguished dentists from various parts of the United States, a large number of eminent medical gentlemen, and quite an assortment of clergymen, statesmen, professors, journalists, and Bohemians." I wanted to include in the list some Mugwumps. But, Mugwumps are hard to catch this season. I baited a trap with the best bait I could offer, an Odontological Society dinner, and set it for two of the most celebrated Mugwumps in this country; but I could not catch either. I received a letter of regret from one, and a promise from the other that he would be here; but his place is vacant. That shows the confidence that you can put in the Mugwump. But aside from the gentlemen who have honored us with their presence this evening, a number of them have been detained, who would be glad to be with us, and who have written letters showing their respect for us, their esteem for our society and the profession that we represent; and I am sure it will not bore you if I detain you a few minutes in reading some extracts from these letters, and some of the letters in full. A number of these gentlemen had accepted our invitation, but it seems that Providence, or some other high power, has served an injunction upon them before the hour arrived, and they are restrained from coming. I had hoped to have had on my right His Honor, the Mayor, to represent the City of New York, who accepted our invitation, but is obliged to send his regret as follows:

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* It had just been discovered that the gallery had been invaded by ladies, who were partly screened from public view by a curtain drawn in front.

NEW YORK, Feby. 4th, 1886.

Dr. Norman W. Kingsley, Chairman, etc.:

DEAR SIR:—Since accepting your invitation I find that my business will require my presence in Boston on Wednesday, 10th *inst.*; otherwise I would gladly be present at your Annual Dinner. Please express my deep regret to the members of your Society, and believe me to be

Yours, very truly,
W. R. GRACE.

121 GRAMERCY PARK,
Feby. 2d, 1886.

Mr. Norman W. Kingsley:

DEAR SIR:—Since accepting your kind invitation to dine with the Odontological Society, I have been summoned to Panama, whither I sail on the very morning I had promised myself the pleasure of dining with you. I regret very much to be obliged to deny myself the pleasure and beg you will receive my excuses and make them acceptable to your Association.

Very truly yours,
JOHN BIGELOW.

From Judge Arnoux I have just received the following telegram:

ALBANY, N. Y., Feby. 10th, 1886.

To Dr Norman W. Kingsley, New York:

Unfortunately detained here until to-morrow. Please accept regret.

WM. H. ARNOUX.

294 FIFTH AVENUE.

To the New York Odontological Society:

GENTLEMEN:—I regret very much that absence from the city will prevent my accepting your very kind invitation to be present at your

Annual Dinner, on February 10th. Such meetings are, I feel sure, of great benefit, in bringing into closer relation men who are earnestly engaged working for the advancement of the same objects, and giving the impetus of combined effort toward the accomplishment of those ends which individual efforts could only reach by slow degrees. Dentistry has indeed made great progress within the last quarter of a century. Step by step it has advanced in the hands of patient and faithful workers in the field, till it has reached so high a point as an art, that it has even now become a science. This is a matter of vast importance to physicians, as well as dentists, for a careful application of scientific dentistry not only contributes to the comfort and beauty of appearance of the human race, but it is also an important factor in the preservation of health.

Wishing you all a very pleasant time, I am

Yours respectfully,

Jan. 28th. T. GAILLARD THOMAS.

NEW YORK, 43 West 32d St.,
Feby. 9th, 1886.

Norman W. Kingsley, Chairman Committee, etc.:

DEAR SIR:—I regret exceedingly that I cannot accept your polite invitation for to-morrow evening. I would like very much to meet my old friends and express to them my appreciation of the value of their services to myself personally and to the world at large; and I would like to say again what I have in effect said to them on a similar occasion: that, to Americans by almost universal consent is given the chief credit of having brought dentistry from a simple mechanical art to the rank of a science, and of having established for itself a just claim to the title of a "Learned Profession," and all this has occurred within the limits *of my own life and memory*.

It has been said that civilization is gradually degenerating human teeth and that it seems possible that we shall finally develop into toothless animals; but if this is to happen, it is a consoling reflection that your skill in your art will make the absence of the present natural growth less of a calamity.

Very truly yours,

FRANK H. HAMILTON.

---

84 CLINTON PLACE, NEW YORK,
January 14th, 1886.

DEAR SIR:—

I regret that it will not be in my power to accept your very kind invitation to dine with the Odontological Society, as I am to leave town on the 8th of February, and shall not be here on the evening named.

Please make my excuses to your fellow-members and assure them of my great respect for their Society and the profession which it represents.

Very truly yours,

CHAS. P. DALY.

To Dr. Norman W. Kingsley.

BELLEVUE HOSPITAL MEDICAL COLLEGE,
NEW YORK, January 23d, 1886.

Mr. Norman W. Kingsley, Chairman Committee:

DEAR SIR:—Please present my thanks to the New York Odontological Society for the compliment of an invitation to the dinner on the evening of Feby. 10th. I regret that my lectures in two colleges and labratory investigations debar me from the excitement and late hours of dinner entertainments, hence I must deny myself the pleasure you so kindly offer me.

Yours respectfully,

R. OGDEN DOREMUS.

NEW YORK, February 2d, 1886.

MY DEAR DR. KINGSLEY:—

Your kind invitation to the dinner of the New York Odontological Society on 10th February, is very tempting, and I need not assure you how much pleasure it would afford me to avail myself of it, were I allowed to enjoy such festive occasions. I know that there will be wit and mirth and good cheer and a charming assemblage, all of which I am constrained to forego.

With thanks for the invitation, my regards to your distinguished associates, and regrets that necessity prevents my being with you.

I am, very truly yours,

HAMILTON FISH.

---

44 WEST 56TH STREET, Jan. 27th, 1886.

MY DEAR SIR:—

I fear that it will not be practicable for me to attend the dinner of the Odontological Society on the 10th proximo, to which you so kindly invite me. The pain the members of your Society so often bring to the mouths of others will be adequately punished by the mouths of the speakers you mention without calling in the services of a Judge. I beg you will therefore accept my thanks and regrets.

Very respectfully,

NOAH DAVIS.

To Dr. Norman W. Kingsley.

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507 MADISON AVE., NEW YORK, Jan. 12th, 1886.

MY DEAR SIR:—

I am in receipt of your very kind note of yesterday with the card of invitation to the dinner of the New York Odontological Society, on the evening of February 10th. It calls, of course, for a prompt answer, and in sending it I am reluctantly compelled to say that my presence in the city on the day named is so uncertain that I dare not accept. I regret this (all the more) because of your assurance that I need not think over a speech. With best wishes for the Society and for yourself, I am

Very truly yours,

JOHN T. HOFFMAN.

To Dr. Norman W. Kingsley.

West New Brighton, Staten Island,
N. Y., January 11th, 1886.

Gentlemen:—

I am sincerely obliged by the honor of your invitation, and I wish that it were practicable for me to accept it. But I am obliged by my constant occupations to deny myself many pleasures of the kind that you propose, and with great regret I am compelled to decline your friendly summons.

Truly yours,

George William Curtis.

Hamilton Club, 146 Remsen St., Brooklyn,
Wednesday, February 10th, 1886.

My Dear Doctor:—

At this late hour, and with regrets, I must decline your invitation to dine with the Odontological Society to-night. Until the last possible moment I have waited, hoping that I might still be able to accept, but I cannot. The science and skill of educated dentists are doing so much to assuage suffering and promote health that I should be very glad to unite with your guests in paying deserved honor to your profession. The lawyer and the doctor boast their callings, but we may well bow down before the dentist for he alone has succeeded in compressing the jaw and reducing the cheek of the advocate and filling the cavities of the physician's head. While in the matter of bills the fashionable dentist almost equals the Wall Street attorney and the Sanitary plumber.

Faithfully yours,

Stewart L. Woodford.

Kingston, New Mexico, Feb. 1st, 1886

Dr. Norman W. Kingsley, Chairman:

My Dear Sir:—Your polite invitation to be present at the annual dinner of the New York Odontological Society was forwarded to me from St. Louis. It would give me great pleasure to meet around the social board so many distinguished members of the dental profession as the annual dinner of the first local society in the land is certain to bring together. No other occasion of a like nature will be likely to attract so many of the leading minds connected with dentistry, and for this reason as well as for the strong desire I have to meet the members of your Society, many of whom I hold in the highest personal esteem, no circumstances of an ordinary character would deter me from being present. Being, however, in this distant part of the country, where I shall probably remain for some weeks to come, I must again deny myself the pleasure of accepting your generous hospitality, yet I do so in the hope that at some future time circumstances may enable me to be present at so notable a gathering and to participate in the social and intellectual enjoyment the occasion is certain to afford.

Thanking you, and through you the Society which you represent, for your thoughtful attention, I am, very respectfully,

Your obedient servant,

C. W. Spalding.

BOSTON, Feb. 1st, 1886.

My Dear Doctor Kingsley, Chairman, etc.:

In thanking you for the honor of an invitation to the annual dinner of the New York Odontological Society I beg you will accept my grateful acknowledgements and be assured that my will is good but my engagements will prevent me from being with you in person. The pleasure of enjoying a social evening with my New York friends would renew my old associations of Park Place, 1838. Dentistry stands now upon a solid basis—we are able to point to rules founded on principle and practice based upon systematized experience. Our responsibilities have been largely increased, but while we are required to do more and know more, to do better and improve with good taste, it is a real satisfaction to feel that we are constantly having the additional aids of established science. If anyone becomes the victim of malpractice he can have the benefit of a defined and discriminating judgment. I would say more but I will embrace in a single sentence all the meaning I would convey dictated by my feelings: May God guide and bless you and your Society in your best wishes and endeavors is the sincere desire of your friend. Very truly,

ELISHA G. TUCKER.

HOUSE OF REPRESENTATIVES UNITED STATES,
Washington, D. C., February 8th, 1886.

To Norman W. Kingsley, Chairman, etc.:

SIR:—I will not come—I cannot come—I wish I could that I might tell to your brilliant company the suffering you have caused me these many years. You may say that it does not lie in my mouth to say so, but one moment's examination of a skillful operator would prove it. You have bored me time and time again; you have filled my head with all sorts of things, fortunately most of these fillings came out. I have borne all this, but now you have touched the nerve and I will not bear that. You say I said I would surely come. You imply that I have lied and I use, sir, plain language in reply—it is you that lie—not in your teeth, oh, no; you keep your own to give others the false ones. But I will say that you lie in your throat for I am determined you shall not escape by saying it was a *lapsus linguæ*. For many years you have spoken of me and mine as "my patients," please remember that now my patience is gone.

I am, sir, your obedient servant,

WM. WALTER PHELPS.

My last letter is from "The Autocrat of the Breakfast Table," to be used at the Odontological Dinner Table:

296 BEACON ST., BOSTON, Jan. 22, 1886.

To Dr. Norman W. Kingsley:

MY DEAR SIR:—I regret that it will not be in my power to attend the annual dinner of the New York Odontological Society to which I have been kindly invited by the Society through yourself and its representatives. In my lectures at the Medical School of Harvard University I had for many years a number of dental students among my audience, some of whom ranked with the best scholars of their year. I remember them with pleasure, and every Christmas I am reminded that they have not forgotten me. I often think of the forlorn condition of some of the great personages of history in the days when there were no dentists or none who would be recognized as such by the dental artists of to-day. Think of poor King David, a worn-out old man at seventy, probably without teeth and certainly without spectacles. Think of poor George Washington, his teeth always ready to drop like a portcullis and cut a sentence in two. See him in Stuart's admirable portrait, his thoughts evidently divided between the cares of empire and the maintenance of the *Status in quo* of his terrific dental arrangement. Think of Walter Savage Landor's melancholy complaint, that he did not mind losing his intellectual faculties but the loss of his teeth he felt to be a very great calamity. I will venture to propose then "the Dental profession and this association as its worthy representative." It has established and prolonged the reign of beauty, it has added to the charms of social intercourse and lent perfection to the accents of eloquence: it has taken from old age its most unwelcome feature and lengthened enjoyable human life far beyond the limit of the years when the toothless and purblind patriarch might well exclaim, "I have no pleasure in them."

I am, dear sir, yours very truly,

OLIVER WENDELL HOLMES

The representatives of the press here this evening have asked me for a list of toasts, and I have told them there was but one toast, and after that it would be a sort of Madison Square Garden performance,—go as you please. The toast of the evening will be responded to by one of our own members, one who has often been heard by our *confreres*, but I dare say rarely if ever heard by our invited guests. The Toast is, "The Odontological Society," and the response will be made by Dr. J. Smith Dodge, Jr., whom I now take pleasure in introducing.

DR. J. SMITH DODGE, JR.

Mr. President and Gentlemen:

It seems a little cruel to call upon another dentist, when all around these tables are sitting the invited guests from other departments of life, whose principal acquaintance with our art consists of memories of the forceps and the burring-engine, and whose thoughts, if we could anatomize them just now while they wait eagerly for a chance to speak, would, I think, be found dominated by that principle which impels the visitors to a menagerie when they are sure the tiger is securely caged, to prod him with their unbrellas. But, brethren of the profession, we may serenely endure their witticisms, remembering that to-morrow, when office hours begin, it will be our turn once more. And yet, gentlemen, perhaps it is well that a member of this society should first sound, if I may say so, the key-note which will express the meaning of these festivities. It is readily suggested, by comparing this meeting with one which many of us attended last evening. That was the regular meeting of the Odontological Society. It was largely attended. Perhaps every man there was a dentist. Every subject broached, almost every sentence uttered, had relation to the dentist's art ; and much of what was said would have been unintelligible jargon to the ears of those not dentists. That was the regular meeting, such as we hold from month to month. To-night we sink the dentist in the man, and, honored with the presence of gentlemen whose names are familiar to our city and to our land, we gather about this social board, not merely to enjoy ourselves, but to catch, I will venture to say to you, a suggestion which grows out of this very contrast. The dentist is a specialist. His field, compared with the vast scope of human interests, is a circumscribed one. While he is in it he must confine all his thoughts and his best attention and endeavor within this little circle ; and yet he is glad to come out of this and to show his sympathy with other professions and with whatever interests concerns that mankind. Wherever the largest culture, the utmost energy, the leading interests that move forward in the van of human progress are to be found, there the dentist reaches out his sympathies and is ready to grasp hands as with a friend and a brother. It is good for us to come out of our seclusion and to be for a time no longer set apart and separate, but to feel that in all the great concerns of human interest we too are concerned. How wonderful is that mystery of human life which ordains that while every man must bend himself to something which is a very small portion of all the interests of men, yet, nevertheless, just in proportion as he is intent upon his one concern, and does well and bravely that little which Providence has committed to him, just in that degree he broadens forth and rises up and becomes more and more, in all the largeness of the world, a Man. It is not only true of dentists, but it is true of every careful and competent worker among the affairs of human society, that that which constitutes the value of his achievements, that which constitutes his claim to praise and confidence and honor among men, begins with something that seems small and narrow at the first glance, but which derives its qualities and claims to praise from the fact that it is a doorway leading to all humanity. We may appeal to our honored guests of every other department of cultured, intellectual, energetic life, if this is not so, if the true claim to greatness, to worth, to honor of each man, does not grow out of his labors in his special craft, and when this is recognized it is a recognition that he who does his own work well, however narrow his field may seem, is contributing more than glittering generalities or diffuse usefulness could possibly do to help the world move forward. Nor is this all, for it is a converse fact that this sense of wide sympathies and large connections helps the individual work of the narrowest and most circumscribed worker. He who shall go to-morrow to his desk, to his operating chair, to his brief or his sermon, with a feeling that he is lying hold of a corner of the world and is having in his achievements something to do with the largest welfare of mankind, will do better the little thing to which he turns his attention than he would if he thought of nothing but just that. May I make a professional and recent illustration? Those of you who were at our last evening meeting no doubt looked with interest upon an instrument for the minute examination of teeth which was exhibited there. It consists of a pair of ordinary spectacles, upon the middle bow of which is mounted a minute but powerful electric lantern. It is the combination that I want to speak of. The lenses are so sharp and keen that you can trace every hair line, and investigate every dot and point; but they would be useless in the dark, and are only useful here, because they are coupled with that illuminating centre which spreads the light that is in these days becoming indeed the light of the world, upon the object to be seen. This radiance and power to illuminate are combined with microscopic vision, and through this combination all things can be seen.

Gentlemen, there are so many others whom we hope to hear with pleasure, that I will not detain you. Let me but suggest this as the meaning and purport of our meeting, that dentists live in no narrow cell, that they are shut off in no-wise from the widest sympathies and best activities of men; that it is for them, as it is for all men, to take the largest and best the world can give of life, of energy, of sympathy, of brotherly affection and fraternal help, and to concentrate it all upon their daily task; so that every act well done shall become by this intense illumination, this exhaustless energy of all the forces of civilization, a step in the triumphal procession of humanity, a note rightly sounded in the grand harmony of our race.

DR. KINGSLEY.

In an active practice of not a few years, I have frequently discovered that my patients knew a great deal more about dentistry than I did. We dentists, as has been alluded to by the speaker who has just sat down, are in the habit of coming together and exchanging our professional ideas, helping one another and giving our individual opinions; and it has gone so far that we have nearly talked ourselves to death. Each one has found out pretty much all that the others know; but I am satisfied that we have not reached the limit of human knowledge. As we cannot seek it any longer among ourselves we must go outside. I believe if we should ask some of those who have sat in our chairs, from time to time, to tell what they know about dentistry, they would be able to give us a great deal of information, and thus in the future course of our entertainment this evening, those gentlemen who have never practiced dentistry will be able to contribute something to the sum of human knowledge. We have with us this evening, a gentleman whose reputation is world-wide. He has a marvelous feature. Those of you who have seen the opera of the Mikado will remember that Katisha had a marvelous left shoulder that people traveled miles to see. Now I know there are gentlemen present who have traveled a thousand miles to see this gentleman's jaw, and hear him shoot off his mouth. I want to introduce to you a "son-of-a-gun" from New York: General Horace Porter.

GENERAL PORTER.

Mr. President and Gentlemen:

I have listened to the remarks embraced in this remarkable introduction of me by your chairman, and I must say they are eloquent, unctuous, brilliant,—and untrue. There seems to be a refinement of cruelty in calling upon me as the first of your guests to speak to-night; asking me to throw the first fire-brand into this comparatively peaceful inclosure. You seem to be treating me like one of those pilot balloons which they send up before the real ascension to test the upper air current; and no doubt before I get through this evening, I shall have pretty well tested both the upper and the lower currents of thought in this assemblage.

As I was coming down here to-night, an acquaintance of mine met me and cried, "Where are you going?" I said, "I am going to the Odontological Dinner." Said he, "I would not like to be seen in a place of that kind." I told him I had even gone so far, recently, as to attend an Ichthyophagus Dinner, and that surely nothing could be worse than that. It was all Greek to him. He pondered upon those names, and seemed to say to them as Manrico says to Leonora in the opera: "and yet is thy name a spell?" I said, "I shall venture to the Odontological Dinner, and I hope to escape from those dentists with no greater sacrifice than befell the late Artemus Ward when he made his escape from the Mormon ladies in Utah, of which he said: "I got away with my virtue unimpaired, but it cost me a new suit of clothes."

I regard myself as a fit subject for congratulation this evening, for it is the first time in my life that I have got into the hands of dentists and had my mouth left in a condition for speaking. In regard to speech, on those occasions the dentist always has everything his own way. Your President seems to have designated for speakers first, those who are nearest to him, and whom he can consequently get at most readily. He probably is moved by the same motives that actuated that itinerant professor who went around, some years ago, advertising and offering to bet that he could pull out more teeth in the same length of time than any other man living or dead. A countryman came up to him one day and pointed out two back teeth that he wanted to have drawn. An anæsthetic was administered; and when he came to, he found that two front teeth had been pulled, he cried, "Great Scott! Didn't I tell you to pull them two back ones?" "Yes," replied the professor. "Well, why in thunder then did you pull the two front ones?" "Well," said the professor, "they were kind o' handier to get at." I believe your President has designated me as the first speaker because I was sitting next him, and was a little handier to get at.

Dentists, I think, sometimes stand in their own light. We have an instance of it to-night, in their having displayed their professional knowledge and skill in perfecting the articulation of some of the gentlemen who are on the list of speakers this evening. I do not want to reflect upon the ages of any of the gentlemen at this end of the room by mentioning figures, for figures do not lie, except figures of speech, and they always do; but if you had not paid this attention to our articulation you might have enjoyed to-night the rare and peculiar privilege which is not often enjoyed at New York dinners, the inestimable advantage of not being able to understand a word that is said by the after-dinner speakers.

I find that I recognize in your President one whose patient I have been for many years. He has treated me a long time; probably not purely from motives of friendship, but, as they say in discussing the tariff question in Congress, for "purposes of revenue only." The wheel of fortune takes many a turn, and occasionally the right comes uppermost. At last, I find that he is in the chair, and I am standing over him. He has taken many a turn with me, and on those occasions I always felt myself drawn toward him, and he generally got away with a portion of me. I have known him perhaps longer than many other gentlemen at these tables, but when I mention his name I always think of that Frenchman in Paris, who, during the revolution when the guilotine was doing its dreadful work, said he could never hear the name of Robespierre pronounced without involuntarily taking off his hat to see if his head was still in it. So when I hear pronounced the name of the man who has made those memorable raids on my mouth, I always put my hand to my mouth to see if my teeth are still in it. And whenever I meet him professionally I am forcibly reminded of the lament of the poet Halleck, "I sorrow that all fair things must decay."

I may do them injustice, but dentists seem to derive a peculiar satisfaction from the practice of their art, appearing to enjoy the misery of their victims, like the native Texan who used to come down to a certain army post occasionally, and who never appeared there except when some soldier was undergoing punishment. But as soon as a culprit was subjected to punishment this native always appeared and sat on the fence and looked at him, chuckled and rubbed his hands with intense delight. One day a soldier, who for some misdemeanor, was carrying a log of wood on his shoulder, said to this man, "Have I ever done you any harm?" "No, sir; I never saw you before in my life?" "Well, then why do you always come down here when a man is undergoing punishment and sit on the fence and grin and chuckle like a chimpanzee? Have you got anything agin me?" "No," said the native, "you never done me no harm, but the fact is I delight in human misery generally."

Now, gentlemen, let me simply say to you in all seriousness, that I think the world has come to realize, more especially within the last ten or fifteen years, that your profession is becoming clothed with the dignity of a beneficent service to humanity, and we appreciate more fully than ever before that we are indebted to you for some of the greatest comforts in life. We realize that you lay under contribution all the branches of science and of art in accomplishing those marvelous triumphs of your profession. And science, you know, will tell. Science never fails, except in grappling with two subjects,—religion and plumbing. You have it in your power to mould the features of men and women; and whether a girl shall become a handsome or a homely woman depends very much on your skill in shaping that most expensive of features—the mouth. We sometimes look at the pictures of distinguished public men and say, "observe those firm-set lips, and that determined jaw which nature has given ; they indicate the distinguishing qualities and character of the man," when perhaps after all he is not so much indebted to nature for those marks of greatness as he is to his dentist. Gentlemen, it is your province to give character to our public men, though some persons think that in this age it is a rather meagre and unsubstantial gift. Dr. Holmes has referred to General Washington. History says that in his youth he had a beautiful bow mouth that captivated all the women in Virginia, married and single, but his dentist came along and manufactured those artificial teeth, which were said to have been set on solid blocks and tied in with a shoe string. They gave that post-office box mouth to the father of his country, with which he has gone down to history.

But, Mr. Chairman, let me say in conclusion that I wish you had called on me last instead of first, because I know that that so often lightens one's labors. I know there is one instance of this recorded on a member of your own profession. When LeClure was appointed dentist to King Stanislaus, it is said that he received his appointment on the very day the king lost his last tooth, and his labors were in consequence undoubtedly lightened. The man who comes last is often to be envied.

DR. KINGSLEY.

GENTLEMEN :—When I was a lad, some fifty odd years ago, a month or two will make no particular difference as to the time, I remember that an uncle of mine went to Boston, and when he returned he reported to his family at home what he had undergone at the hands of a dentist ; and I acquired the idea at that early age that dentists must all be either lunatics or cranks. And yet, gentlemen, I am here. With that idea in my head, and desiring to get some information upon the subject, I had asked to be present with us this evening the Superintendent of the lunatic asylum upon Ward's Island, the gentlemen who acted as an expert at the trial of Guiteau in Washington, and pronounced him sane. I said if he could pronounce Guiteau to be sane there may be some help for us, and I would like to have him present and diagnose the case. It was not until this evening that I found that I was doomed to disappointment. Here is a letter from his wife which I must read :

To Dr. Norman W. Kingsley:

Dear Sir :—Dr. Macdonald wishes me to express to you his very sincere regrets that he cannot be present at the dinner this evening. He has been confined to bed for three or four days past, and has waited till the last moment to withdraw his acceptance, he has been so strongly in hopes of being able to be up and about, and it is with the utmost reluctance that he gives up the pleasure he had promised himself for this evening.

Very sincerely yours,

Elizabeth Macdonald.

Ward's Island, Feb. 10th, 1886.

I think if anyone had asked me within the last twenty-five years whom, of all the men in this city, I revered, respected and esteemed the most, the one by me beloved above all others, I would unhesitatingly have said, Howard Crosby. But then, gentlemen, how must I feel when I wake up and discover that he is a bold, bad man. From last Sunday's *Tribune*, which never told a lie, I clip the following:

"The *Voice*, of this city, contains an interview with a man interested in the liquor business who says that 'the Reverend Dr. Crosby is in league with the brewers.' Dr. Crosby may thank his lucky stars that he got off so well. It is a fact well known (to many liquor dealers) that Dr. Crosby runs several beer saloons under an alias, and that he is therefore interested in having beer licenses cheap. This is the only way in which his attitude on the liquor question can be explained—by some liquor dealers. It is to be feared that Dr. Crosby's congregation, and reputable people generally, do not know what a deep, dark man he is ; but the liquor dealers can tell them." Now, that is a pretty severe indictment. I am going to give him an opportunity to defend himself, and I hope that in doing that, if he has any eloquence to spare, he will defend us from some of the reflections cast upon us by the last speaker. Gentlemen, Dr. Howard Crosby.

DR. HOWARD CROSBY.

I want to say first, in reply to Dr. Kingsley's insinuations, that Dr. Barker, who sits at my side, has all the wine, and I have had nothing but a glass of water.

Mr. President and gentlemen of the Odontological Society—your patients call it the O-don't-ological Society—I came into this hall under great confusion. I thought when I was coming to this end of the table that I was coming to the head of it ; but I found that I had come to the tail ; that over there is the *bogue* President, and this here is only the bogus President. But I shall have to make the best of it. I have thought that God in his providence designed America to be the land which should correct the errors of the old civilization of Europe; and there is no branch of science that is acknowledged by our European brethren to be so far ahead of the same science in their own land as the science of dentistry. Your profession, American dentistry, has taken the lead in the Old World. We have taught them many other lessons which they do not as yet acknowledge. We have tried in this country to start from original principles and to get rid of the prescriptive folly that exists abroad, and in the course of time the work will be achieved and completed. One thing that we have to teach them is to get rid of snobbery. It is snobbery abroad—alas too much imitated in a city like New York, but New York is not America—it is snobbery abroad which calls the idle man, the useless man a "gentlemen," and the man who works and benefits mankind a "nobody." It is snobbery which makes the speculator in stocks or what not, disturbing the peace of the community by his selfishness, a man of distinction, and makes the teacher of our youth, who trains the mind and prepares the true man, one of small account in society. And snobbery does another thing. God has made man's body with his face the noblest part of it; other parts which are not so noble are decently covered, yet the man who exercises the highest skill and the most consumate art on the face, the noblest part of man, is put far lower in the scale of society than the man who expends his skill upon the opposite portions of the body. It is a part of America to correct this great error and to show that the skill and the science that you represent are as high and distinguished as that which exercises itself on any other portion of the human frame. You as a society have done much toward raising the whole profession of dentistry to the high position which it now occupies in this land. And you have not done it by any great philanthropic work, but by the overpowering argument of your own skill and science; you have squelched all odious comparisons, and put yourselves on the same level with the most skillful surgeons in the world; and all those who love the right and the true must congratulate you and thank you for this that you have done.

There is only one thing I will add. That the highest science is of small avail if it is not combined with sturdy common sense. You have a profession which leads you into the most profound research, the most careful discrimination, the most earnest and abstruse study of material things. You have a science whose elements are akin—and some of you who are here to-night are bright examples of it—are akin to those scientific elements that are found in the fine arts. I might point you to one by my side who has shown those traits which mark you all as they are exercised in one of the noblest of the fine arts, and who, if he were not one of the best surgeon dentists, would have been one of the best sculptors in this or in any land. But, as I said, science needs to be mingled with common sense for its perfection, indeed, as all learning needs to be. No bigger fool can be found on earth than a learned fool, a man who has learning and is not able to use it; and the man who has scientific knowledge, and even professional skill combined with it, is not the man he should be until he has wisdom or common sense, for they are the same thing. In taking my seat I simply wish to thank you, gentlemen, for the opportunity I have had of being with you to-night and testifying my gratitude to you as professional men for the exalted position in which you have placed your profession in this and in other lands, so that the American dental surgeon is recognized with respect and received with hearty welcome wherever he goes in the world.

DR. KINGSLEY.

Mr. President :—The Hon. Bardwell Slote, in the play of "The Mighty Dollar," had a peculiar way of abbreviating the appellations which he applied to his acquaintances. For instance, it was simpler and more convenient to designate a friend as a P. I. G., a perfectly independent gentleman. If I should adopt that style of denomination, I should be inclined to introduce the next speaker to you as the great G. G. G.,—genial, gentle Garretson. Many of you have heard him, and know very well that each one of those attributes applies to him.

PROF. GARRETSON, OF PHILADELPHIA.

It is with exceeding great pleasure, gentlemen, that I again find myself seated with you at the convivial board. Life is a matter of receiving and giving. You of the Odontological Society are generous givers. You make your recipients feel very poor by the contrast of what they have to offer back. I could wish, speaking as one of your guests, to be the bearer of a gift proportioned, in some little degree at least, to my appreciation of your kindness and my estimate of the force and character represented in the membership of the association. The Odontological is indeed a working society. Breadth is a magnificent professional attribute; and here you have extension in a wide sense of that term. How true the old familiar saying that "it is not the profession that honors the man, but the man that honors the profession." It is a matter too evident and well-known to allow the spoken word to savor of undue praise, that the membership includes some of the strongest and worthiest men of the country. Truly this is the case to so marked an extent, that to make selection of individual names would be to call to notice a multitude.

I want it to be put on record that my honorary membership in this society is one of the compliments that remain a source of pleasure to me. It is an agreeable thing to find one's self linked and bound with the cultured and refined, and if these things be not with this society, where will one look for them? These are represented by science and art. Within reach of my hand almost, I see sculpture, authorship, metaphysics, philosophy in a wide sense, and beautiful attainments in many special directions; besides these helpers of their fellows.

We work in various parts of a common field. Out of our variety we bring general good. Your relation with this general good and my relation with it makes our interest a common one, and we sympathize with what is being done by professional men at large and by each other.

Out of the time that has passed since we last met, much has been brought and there will be much to tell, or that could be told, here to-night.

Several years ago I spoke before this society concerning the inauguration of a work for the establishment of means for the study of oral surgery. It is with inexpressable pleasure that I find myself able to tell here to-night of an unexpected measure of success. The Hospital of Oral surgery now stands a solidly supported fact, held up on the one side by the strong walls of the Philadelphia Dental College, and on the other by money and a large Aid society, represented by the Board of Managers of the Medico-Chirurgical Hospital and College. A visit to the institution will show large wards, a fine amphitheatre, a matron in charge, visiting committees on duty every day, a resident physician, nurses, resident druggist, togethcr with clinical cases which allow the teachers to keep continually covered the full ground of the department. Oral surgery has as its father the specialty of dentistry, even though its mother is the science of medicine. To-day oral surgery stands represented in all dental colleges by special professors, and to-day oral surgery is one of the sterling instruments which accomplishes great work for the common good. For myself I shall depart the happier for the consciousness of having had a part in the inauguration and establishment of the good. Oral surgery will enlarge in the future as the rolling snow-ball gathers bulk. More and greater reason will men have for congratulating themselves that dentistry enlarges its borders, and the acquirements and work of its practitioners. A new heaven has been opened. Fixity has taken the place of unstableness. Certainty replaces doubt. Width has come out of narrowness.

I take my seat, gentlemen, glad to have lived long enough to see the establishment of this hospital, and to be able to tell about it, and to find myself occupying a position in relation with it which allows me to play the part of host to any of you who come to see our newest departure.

I will not allow myself to occupy time that in turn others may tell, and we may hear what is being done in other directions. Let me, however, impress you with the pleasure you will give me and my colleagues by coming to see our, and your, new hospital.

DR. KINGSLEY.

Mr. President :—No course of public speaking after dinner is complete where Dr. Atkinson is, until his voice has been heard. Dr. Atkinson, will you be kind enough to let us hear from you ?

DR. W. H. ATKINSON.

Mr. President :

I am happy to-night, beyond my ability to express, in the presence before me. The time was when my highest ambition was to be a minister ; and then my ambition was to be a lawyer, and then a doctor. And when, in consultation, in the innocency of my youth and earnestness I tried to get at the truth in order to remove the troubles which my patients suffered, and for which counsel was called, and finding no agreement among physicians, and no fixed science by which the individual could pronounce judgment upon a case clearly and with certainty, I felt that there was indeed something rotten in Denmark. Having made myself familiar with physiology, pathology and therapeutics, I cast about to see how I could utilize this field for the good of humanity ; and this was at a time when thirty-five cents was worth a thousand dollars to me. Looking over the subject I saw that there was something that involved all the principles contained in the noble profession of medicine, and culminating in the happiness of the human being, and that had not been over-run by false precedents. That was dentistry. It was then almost a *terra incognito*, a field that had not been explored. You know I have always contended that dentistry belongs to the healing art. I said I would try and see what, under the guidance of the powers that move matters, might be done to raise dentistry out of the mud and muddle in which it was, and place it upon a scientific and demonstrable basis. I was trying to get at something by which we could demonstrate principles, that we might not continue to make mistakes, but be fitted for the special work of caring for the human body, believing that if a man had a good digestion he is not a bad man. It is through this ability to appropriate food material and convert it into chyle and blood and then into tissue, and so on all the way through, that we get in condition to make diagnoses which justify themselves to the hardest and most bull-headed men you meet.

The time has gone by when we were in that placental condition that made us ashamed to speak before intelligent men. The time is at hand when dentists can prove what they are doing. Truth belongs to us all. What then can we teach but formulations of the truth? When a truth has been revealed to us, what we have to do is very simple, although it may be great in name, and we may be afraid, by reason of our own estimate of the little we know to deliver the message that Heaven gives us as our part of the work.

What is the duty and the demand now upon an association, meeting in such a conclave as this? The first seems to be to have a good dinner. But then there is a Divine object for which the good dinner helps to fit us. There is an onward and an upward to the right; there is a backward and downward to the left. If we would trust to the best elements of our natures, if we knew how much we could depend upon the fraternal regard of these friends whose faces beam upon us, and who have been spending their whole lives in trying to redeem their fellows from the errors of ignorance, we should have a mutual admiration society, and inaugurate Heaven on earth.

DR. KINGSLEY.

GENTLEMEN ;—It is with great pleasure that I announce that we have with us this evening the Reverend Dr. Beard, of Paris, who has kindly consented to speak to us for a few moments.

REV. A. F. BEARD, D. D.

When word came to me within a few minutes, that I should be called to express some general sentiments declarative of sympathy with this festive occasion, the surprise seemed quite in harmony with my early ideas of your profession. In my experiences, it seemed to delight in surprises, very deftly the molars were extracted when we supposed our professional friend was simply curiously investigating the real state of affairs. With what cunning dexterity he took the right one or the wrong one—or both—before we were aware of his real intentions! How keen his sight to discover that we were worse off than we thought we were! It was a succession of sorrowful surprises!!!

This present unexpectedness would be less grievous, had your Chairman given me a text, or if he had sent me something to read, from his packages of manuscript. I have had practice with manuscript.

It certainly has afforded me pleasure to observe this evening with what facility those who exercise great skill with other people's teeth are able to use their own. The grinders have not ceased to-night. No one can say that this Society has not set a glorious example in this respect.

I also have been reminded that there is a kindred—even if remote—line of sympathy between our respective callings. Had it not been for the teeth, probably the forbidden fruit would not have been eaten, hence, for both you and me Othello's occupation would be gone. A fellow feeling should make us wondrous kind.

Rev. Dr. Crosby in his choice words has spoken to us of the nobility of service. He who serves his fellow men wears the robes of honor. I was thinking while he spoke that scarcely too much can be claimed for a calling which has for its ministry not only the alleviation of pain, but the health and usefulness of those whom it serves, we cannot estimate the value which makes life desirable. I have been impressed also with the call there is in your profession for the development of the finer feelings in nature. It is not possible for one with a coarse nature to have the highest success in it; one must needs be a gentle-man to be the true surgeon. He must have more than the artist's skill. He must have the sensitive heart.

It has given me a patriotic pleasure while sojourning in other lands to see how Americans have exalted your profession from the rubs of a mere business into the kingdom of honorable professionable service. It goes without saying that American doctors of dentistry are the recognized authorities in all lands or men of science in their calling. In my home, in Paris, American dentists are the confessed leaders and teachers in their profession.

The operations of your President, Doctor Bogue, have been frequently quoted in the Paris medical journals as being great advances upon European knowledge and practice ; and I happen to know that the superiority of American dentists in Paris is frankly conceded both by the medical schools and by the people themselves.

I have had occasion to congratulate myself there for the friendship of your profession, as well as for its skill and science. May the Odontological Society never, never cast any lesser shadow than it does at this dinner.

DR. KINGSLEY.

At our Annual Dinner a year ago, at about this hour of the evening, it became my very unpleasant duty to make an announcement which brought sorrow to all our hearts. The intelligence which I conveyed had been in my possession from the early part of the evening, but had been kept to myself, because I knew it would throw a cloud over our festivities. You will remember that one of our most esteemed and honored members was taken suddenly and alarmingly ill, and the shudder that went around our board, in the fear that he would never meet with us again, can hardly be described. To-night we can contrast our feelings with that occasion, for our distinguished associate is with us and in perfect health. I want you to rise and join with me in drinking to the sentiment: Health, long life and prosperity to our beloved *confrère*, Dr. William H. Dwinelle. [The health of Dr. Dwinelle was drank by all standing].

DR. DWINELLE.

GENTLEMEN :—You are too kind. I do not deserve such an expression of sympathy and appreciation of my humble ability and my humble efforts in behalf of the profession. It is too true that a year ago when I anticipated a joyful meeting with you, I was stricken down with apparently a dangerous affliction. It is true that it seemed at that time I might not meet with you again. I cannot thank you enough for the kind sentiments that were expressed on that occasion, and for the published expressions of your consideration and regard which made me blush while I read them with closed doors. In reading these flattering ecomiums I felt very much like one who has the rare opportunity of reading his own obituary; and also that my life and my conduct would hardly stand the test of the praise that was so generously bestowed upon me. Gentlemen, I congratulate you that you are all here on this pleasant occasion. I congratulate myself that I too am here. Again I thank you for all of your expressions of kindness, for your over-estimate of my humble virtues and feeble acquirements. They shall renew my resolves to hereafter live a life of higher usefulness, of charity, and of love, so that when the summons does come to join the innumerable caravan that moves to the pale realms of shade I shall be more worthy of them.

DR. KINGSLEY.

The "hub of the Universe" is pretty well represented here to-night, but I must make some discrimination, and cannot ask all out at once. I think that the first to call upon, at any rate, should be the shepherd of the fold. Will he be kind enough to give a report of his flock, and tell us how it goes with him and his in Boston?

DR. L. D. SHEPARD.

Mr. President, Chairman and Gentlemen: When I read in the *Tribune* two mornings ago a list of the distinguished gentlemen who were to be here to-night, I supposed, of course, that in addition to these only the older and more distinguished individuals of our profession would be called upon. I will try to respond to your kind invitation, although the notice comes to me, as in the case of our Reverend friend who spoke a few moment's ago, only a short time before I am called upon, and so have had little opportunity to do what, it seems to me, a man ought to do in speaking before such an assembly as this—take time so to prepare his thoughts as to speak only to the point, leaving out that which is trivial and irrelevant. The remarks of the preceding speakers have given me several thoughts, and I wish I could present them in better form than I shall be able to do. Like some others I was educated for the church, and it was from my earliest youth promised that I should have the old barrel of sermons which had been preached time and again to different congregations as my paternal ancestor moved from place to place, using up the old material in the new places; but through some perversity of, I suppose, my molecular organization, I did not see it in my way to follow the paternal course. In after years some of those kind and partial friends and relatives, when they found I was to be a dentist, were grieved because they thought I was not to pursue a course in life which was sufficiently respectable, refined, etc., and I had better have pursued some different walk. I have never ceased from the earliest days of my professional experience until the present to be not only thoroughly satisfied with my walk in life, but proud of the position of a dentist in the community; and the remarks of our Reverend friend, who spoke so well this evening on snobbery, and the remarks of others, have caused me to feel stronger in the view; that a man, whatever walk of life he may choose, who earnestly, faithfully, studiously, and with high intentions and good motives pursues that course of life, is a gentleman, a man entitled to honor and respect, and the peer of one in any other walk of life. The remark of another gentleman has suggested to me this train of thought. The teacher deals with the intellect, he has the education of the mind in his care; the preacher deals with those deeper spiritual matters which throughout the whole world are the great foundation of right thinking, right living and noble action; the artist deals with beauty of form and feature, with the expression of passion, of tragedy, and kindred feelings of the mind; the dentist combines all these; it is his work to so perfect, and so take care of and form, and repair when damaged, a part of the human system, as to conduce in a very essential degree to the health and physical well-being of man. As a proof of that it is sufficient to say that our insurance tables have demonstrated that the average duration of human life within the past half century has been so far advanced that instead of thirty-three years being considered the basis of insurance, that basis has been advanced by several years; and one of the foremost of several causes has been the attention which in this current half century has been bestowed upon that apparatus which prepares our food at its first entrance to the system. The second office of the dentist, in which he rises to a higher plane, is in so attending to the early regulation and development of the teeth and their repair that we are made presentable social beings. One of the drawbacks in former ages has been the defective organization of the teeth. One familiar with literature will recall many instances where this defect is referred to in the description of the beautiful and attractive women of the day. So that one office of the dentist has been to prepare or preserve each individual for the pleasant presentation of himself *vis-a-vis* in society. And a third office, which now in these later days has assumed great prominence, is the rendering the human race more thoroughly objects of beauty. The æsthetic craze is the craze of to-day, and the dentist has much to do with that in moulding the features of the young and re-forming and rejuvenating those of the old; so that I have always considered that the dentist occupies a position in life which unites the useful and the ornamental, the practical and the æsthetic, in a most marked degree.

I am particularly pleased to represent here to-night the associate members, if I may be allowed to claim that office, and to express to you who are active members of the Odontological Society our appreciation of the kindness which you manifested last summer in remodeling your organic law so that we are enabled to receive from your Corresponding Secretary, as I did the other day, a copy of the Constitution and By-laws, with a polite note requesting reference to such a section of such an article, and stating that the Treasurer's address was so-and-so Madison Avenue. For many years, with others, I have partaken of your hospitality, have eaten of your viands and drank of your fluids and enjoyed your material and intellectual feasts, and have been largely indebted to you. We shall still be indebted to you, for the little tax that we are allowed to pay is not enough to pay for this entertainment. But it is the privilege, as an associate member, of being here simply as a guest but with certain rights which belong to all members, whether active or associate, and that we are welcome to these dinners of right, that is a privilege which, as one of the associate members, I wish to thank you for, and to say that we feel very much better for it. That the Odontological Society may continue to be, as it has been in the past, the one Society, standing above all others in many and perhaps in all respects, is the wish not only of those who live in the metropolis, but of those of us who live farther off, and who regret that they cannot be with you at your monthly meetings, but who are always present at this great annual feast.

DR. KINGSLEY.

Mr. President:—Some of our guests may not know that they have more than one professor in Philadelphia. We have heard from Dr. Garretson, but there is another professor with us, who, unlike the prophet of old, is honored in his own home, in his own country, and abroad even to the ends of the earth. I have the pleasure of introducing to you the Emeritus Professor in the Philadelphia Dental College, Dr. Kingsbury.

DR. C. A. KINGSBURY.

GENTLEMEN :—I have a deep and tender sympathy with you all. For years I have looked up to the Odontological Society as a teacher, and I recognize in your Chairman this evening a brother that I have regarded as an oracle in our profession ; and I submit to you if it may not be considered one of the most unwarrantable instances of presumption on his part to call on me at this late hour to add anything to what has been said, and said so fully and so well. This presumption is only exceeded on my part in attempting to respond to the call at this late moment. I have always entertained a very humble opinion of my own ability as an impromptu or post prandial speaker. I never thought I possessed that facility of expression that would entitle me to the privilege of even being called upon on such an occasion. I have no silver or gold to give you, but such as I have I give. If I have any point of merit it is in the fact of which I am conscious of having endeavored honestly to discharge the duties of my profession from the time I entered upon it until the present hour. There is another source of gratification, that of having been one of three persons, Dr. McKeon and Dr. Flagg and myself, who against great opposition obtained an act of incorporation for the establishment and organization of the Philadelphia Dental College, from whose Dean you have heard this evening, and who is an important factor in the success of that institution at the present time.

Now, gentlemen, if I should leave the rut that has been followed this evening, and touch upon a thought in a different direction, you will pardon me. I have recognized the fact that during the past year there has been an unusual mortality in the ranks of the dental profession ; and among those who have passed over the dark river are some who have occupied prominent positions in the profession. One whom I will name is Dr. Barnum, who conceived the idea of and brought into use the rubber dam, which has proven of such unconceivable value in practice. Another one that I would name is Dr. Riggs, of Hartford, Conn., who has occupied a prominent position in our profession for years, and who is associated with a very important discovery which entitles him to special mention. It was on the 10th of December, 1844, that Dr. Horace Wells, also of Hartford, conceived the idea of painless operations in surgery.

It was the next day, the 11th of December, that he requested Dr. Colton to give him nitrous-oxide gas at the office of Dr. Riggs, and from his own mouth he had a molar tooth extracted, which was the first surgical operation ever performed under the influence of an anæsthetic. Here was a demonstration of human power to conquer pain, and as one has said, it was fitting that the head that had conceived the great thought should be the first to give it the demonstration of practical proof. Dr. John Riggs was a student of Dr. Horace Wells, and for quite a long period was associated with him in the practice of dentistry, and to him belongs the honor of having performed the first operation under the influence of an anæsthetic. And now, gentlemen, having referred to this, I do not intend to preach a funeral sermon, nor to pronounce a solemn requiem in your presence, but it is fitting and right that on such an occasion as this, we should call to mind the absent ones whose honored names are inseparably connected with the rise and progress of our profession. I am glad to be with you to-night. I think it is both pleasant and profitable for us to meet together in this way. We are out of our offices, and I am glad that we have not our dental instruments here. It is good for us sometimes to be without them. Indeed I remember but one occasion on which I regretted that I had not my dental instruments with me. That was some years ago when I was traveling in the east. Having a letter of introduction from Dr. McArthur, of Damascus, acting consul for the United States at that time, to Abd-el-Kaker, the distinguished leader who withstood so bravely for sixteen years the forces of the French government, I called upon him, and was received most cordially. During the interview he expressed a desire that I should operate upon his teeth, and also upon the teeth of his wife, which was a rather singular demand; and I really felt sorry then that I had not my dental instruments with me. Perhaps I regretted their absence because I thought it would be quite a rare thing and an honorable distinction to operate upon so distinguished a patient, and perhaps because it might procure for me an entrance to the privacy of the harem. On my return to Paris, Dr. Thomas W. Evans told me that formerly Abd-el-Kader, while imprisoned in the Castle Amoy, in Paris, had been a patient of his, and he said, "Did you notice that he had a front tooth missing?" I said I did notice it. "Well," he said, "I told Abd-el Kader that he should have that tooth inserted; but he said, "no, I could not think of such a thing as that, for I lost that tooth in battle, and the Koran says that he who fights for his country must fight even to the losing of his teeth."

There is one other point that I want to touch upon this evening. If there is any profession in the world that needs respite from duty, out-door recreation, free, pure air, and communion with nature to counteract the bad tendencies of close confinement in our offices, it is the dental profession. I want to recommend to you, gentlemen, that you keep yourselves young by taking out-door exercise. Take six or eight weeks vacation, if you can, in the summer time, as I do, and go to some one of the various streams of the Adirondacks or the British Provinces and indulge in the recreative pleasure of angling. My good health, and the youth that flows through my veins to-night I attribute to my habits of recreation and rest from the labors of my profession.

DR. KINGSLEY.

There are but a few moments left to us this evening, but even at this late hour there is one gentleman that we would all particularly like to hear from. Away out on the frontier "where the prairie-dog howleth and the whang-doodle mourneth," there is a small missionary station occupied by a dentist. He is a lively, active creature, but extremely modest and diffident. How in the world he gets a living in that distant region and in such a small place I do not quite understand, but he seems to thrive. I suppose he is hoping the place will grow, and that he may grow up with the country.

DR. J. N. CROUSE, OF CHICAGO.

Mr. President and Gentlemen :—It is hard for me to understand why the brilliant gentleman and sagacious wit, your Chairman, has called me up after all this eloquence as the very last speaker. On occasions like this we usually have the light things first, but this evening the order is reversed. It is very evident this gentleman has never been out West. What is Chicago doing? Nothing but growing; it has taken in all the small cities such as St. Louis, Detroit and all the other cities around. Now, if New York would clean up a little she might become a part of our Chicago. I guess, after all, your Chairman wanted to know what we as a profession are doing. Well, we are working for a living. We don't keep picture galleries and charge our patients for coming in and looking at them; that won't go out our way. Our patients come to us for work. No art receptions out our way. We get along very well, that is, we pay our debts. We have adopted that plan of late. Our creditors suggested it as a good way and I quite agreed with them, but it don't afford any of this grand magnificence I see in every place I look into here. I begin to quite like it; I am trying to find out how it is done. I had a hard time at first to get anything but a glimpse of the office-boy. Why, Mr. Chairman, it beat all to see how surprised, as it seemed to me, all my friends here were to see me. I was met with, What's up? What's brought you here? What's the matter? I had hard work to calm them down; I could not understand it for a while, until I found some wag had reported all around I was coming here to practice; that explained all. I've been getting along splendidly ever since. The fact is I am having a splendid time, I quite like all of you that I have seen. Everybody seems to be a good fellow. All of you are rich as it seems, and that is a great thing. I want to learn that little secret, if I can, before I go home. Won't I make the fellows at home sick when I tell them what they have missed. I have had such a good time and like your town very much; and I like this part of it the best of all, in fact, I sort of hate to go home. But for fear I forget it, I will stop talking, with the wish that you will do so again sometime.

DR. KINGSLEY.

Before we separate, I wish to thank you all for the kind consideration shown me under circumstances more embarrassing than any of you have probably conceived. The thanks of the Society I wish especially to tender to those gentlemen outside of the dental profession, who have added so much to the interest and entertainment of the evening.

The audience may not have noticed several vacancies where seats had been assigned to some of our guests and therefore may not have missed them.

It was not until this evening that the Committee learned that Ex-President Arthur's temporary illness prevented his coming. President Chauncey M. Depew was called almost without warning out of the city and several others upon whom the Committee confidently relied, were unable to meet their engagements. Again I thank you for your consideration and bid you good-night.

ILLINOIS STATE DENTAL SOCIETY.

The twenty-second annual meeting will be held at Rock Island, Ill., beginning Tuesday, May 11, 1886, and continuing four days. Dentists in this and adjoining States are cordially invited to attend.

J. W. Wassall,
208 Dearborn Avenue, Chicago. Secretary.

ILLUMINATING APPARATUS FOR THE MICROSCOPE

BY EDW. BAUSCH, ROCHESTER, N. Y.

[Read Before the Section of Microscopy, R. A. S.]

The subject of Microscope Illuminating Apparatus is an exceedingly prolific one, devices for improving the capacity of the instrument by means of illumination dating from its first use. Much thought and ingenuity have been involved, and considerable has been accomplished, although it must be said in all candor that the subject has received an undue share of attention in many cases. The number of devices is astounding, and it is strange to denote how comparatively few of them are in use. In England much has been accomplished, and the most generally useful ones have come from there. Considerable has also been done in this country, while German workers and opticians have given the matter very little attention until recently.

Any paper treating on this subject becomes somewhat of an historical sketch, and little more can be done than to describe the action of those which are in general use, and mention those which involve note-worthy principles.

The purpose of any illuminator is to improve the appearance of an object to such an extent that it will show more of its structure than would otherwise be the case. As there are two kinds of objects—transparent and opaque—so illuminators may be divided in reference to them; in the first, when the illumination is generally from below the stage, while in the other—the opaque—it is from above.

The most simple form, and that which has longest been in use, is the mirror. As now generally constructed, a plane and concave mirror is mounted in one frame in all microscopes for scientific research, and in all modern constructions is so arranged that it can be used to illuminate both kinds of objects. The mirror being directed to the sourse of light reflects it in the direction of the optical axis. In the plane mirror it is reflected in parallel, or almost parallel rays in the direction of the optical axis, that is, in about the same intensity as the source of light, minus the loss which it undergoes in the act of reflection. The concave mirror reflects the light in such a manner that what is caught up by it is concentrated very nearly to one point, and when the distance between the object and the mirror is the same as the focal distance of the latter, this concentrated light strikes the object. As the distance of the source of light from the mirror is variable, and the focal distance of the former changes, the mirror is generally made adjustable, so that the best illumination which it can give, can be used.

There are many persons expert in the use of the mirror to such an extent that they hardly feel the necessity of any other apparatus; they gain by means of it, very nearly all the effects which are possible by means of additional illuminators. Still the number is small, and although many such have looked upon such apparatus as superfluous, the fact remains that by means of the illuminators higher results are gained, and for the general class of workers a better result is accomplished in much less time and with more ease than could be with the mirror only.

There is no question but that the proper use of the mirror is unknown to many. From my own experience I know that while with higher powers, where there is much loss of light, it is difficult for many to obtain sufficient illumination; on the other hand, it is the case with low powers that too much is used, in which case it becomes not only severe for the eye, but much of the detail which might be brought out is blurred out by there not being a contrast between the light and dark parts in the object.

In all microscopes the mirror is arranged to swing out of the optical axis, and this gives the so-called oblique illumination. In most cases the details of an object are brought out more distinctly in this condition than with central light, owing to the fact that the light passes through the transparent portion of the object without interruption, while the semi-transparent or dark portions cast a small shadow on the opposite side to that of the mirror, thus making the contrast more striking.

The next most simple form of illuminator is any lens, which, placed between the stage and the mirror, makes the light from the latter still more converging than it would be without it; that is to say, that not only is the angle of the beam of light greater, but it is more nearly condensed to one point than is the case with the mirror only. For this reason such a lens is called a condenser, and from the fact that it is used with the sub-stage, a sub-stage condenser, in contra-distinction to the bull's-eye condenser.

At the present day a single lens is seldom used for this purpose, the only one which is used is the so-called hemispherical lens; it must be said, however, that in a strict sense this is hardly a condenser, as when attached to a slide, as it generally is, the center of its curvature is at the object, and the light coming from the concave mirror passes through it without varying much from its course; in connection, however, with the plane mirror it becomes one, but as such, gives inferior results, from the fact that it takes up merely as much light as is equal to its circumference.

The general mode of constructing such condensers is by using two or more lenses, and the variety of these is considerable. In general, such construction for a condenser may be said to be the best, which besides receiving as large a quantity of light as possible, will concentrate it as much as possible into one point. That form which for many years was most generally used, was the so-called Webster condenser. Its optical construction is very similar to the orthoscopic or periscopic eye-pieces; the lower lens or that which first receives the light, corresponds to the field-lens, while the smaller or strongly condensing lens, corresponds to the eye-lens. Below this system of lenses is attached a revolving diaphragm, containing a number of different shaped openings; one with an opening as large as the lower lens to allow a full passage of light; one with a smaller opening, where the quantity, and consequently the intensity is decreased; one or two others with so-called central stops, by which the light through the central portion is obstructed, and the peripheral rays only allowed to pass; these give the so-called dark ground illumination, in which the object is highly illuminated while its surroundings are dark. Still another opening is crescent shaped, thus allowing one-half of the entire or only one-half of the peripheral rays to pass through, thus giving the effect of oblique illumination.

The Wenham half button is somewhat similar in its action to the hemispherical lens, and like this is usually attached to the lower surface of the slide by means of fluid or gum. It is however a condenser, and as it can be used only with medium and high power objectives it is not very generally employed. It is curious however to note that in all these years, and after many experiments, we should turn to these very simple contrivances.

For many years the achromatic condensers were used, but have now fallen somewhat into disuse. They were constructed in different ways, but were all very similar to the objective, with the difference that they had diaphragms and caps with central openings attached. Ordinary low and medium power objectives give fair results as condensers. Moderate angle three-fourths or one-half inch objectives may sometimes be advantageously used. The reflex illuminator is another form, and on account of the novelty of its construction is worthy of mention. It consisted of a truncated cylinder of glass, of which the upper surface is plane and the lower convex; below this is a secondary condensing lens; the entire apparatus is placed entirely out of the optical axis and close to the lower surface of the slide, and in most cases in immersion contact with it. The light when directed from the mirror to its lower surface is concentrated on the diagonal polished surface, and from there reflected through the plane surface and slide, reaching the object at a considerable obliquity. It is used only for oblique illumination.

The paraboloid is an illuminator which in the many years of its use has not lost any of its popularity. As its name indicates, its outer surface is ground to a parabolic curve, with its upper and narrow portion cut off and ground and polished spherically concave, while its lower surface is flat. A dead black spot is fastened at the upper or lower surface to keep out the central rays, while the light which passes through and around it is reflected from the parabolic surface on to the subject, illuminating it from all sides. In some, the stop is made adjustable so that the amount and obliquity of illumination can be controlled.

Of all the illuminating apparatus, however, which is most effective, and that which most quickly came into general use, is the so-called Abbe condenser. There are a number of modifications of this, but the optical parts all depend upon the same general principal which is similar to that of a modern wide-angle objective. It combines in itself almost all the various sub-stage illuminating accessories, and gives the effects of almost all of them; it is of very wide angular aperture, its lower lens being as large as the size of the sub-stage will admit, and concentrates all the light which passes through to one point. For general use the light at this point is so intense as to destroy the perception of all detail, especially with low powers, but by varying its distance from the object or by using proper diaphragms, it may be decreased to almost any extent. It is strictly a non-achromatic combination, but this does not detract from its value. It is now generally accepted that non-achromatic light on the object will give as good results as the achromatic.

An ingenious contrivance is Dr. Ward's condenser, which consists of a wide angle condenser, of smaller dimensions however than the

Abbe, in which the principal feature is the connection of the Iris diaphragm with it, which permits not only an easy moderation of light, but by passing the diaphragm laterally across the condenser, gives any degree of obliquity, and any amount of light in connection with it.

This pretty well ends the list of the note-worthy sub-stage illuminating apparatus and brings us to the illuminators for opaque objects.

First in the list, and the most generally known, is the Bull's-eye condenser. Its construction is so generally known that it is unnecessary to speak of it. I would remark, however, that to properly use it on an opaque object, the source of light should be considerably above the stage, and the best results are gained when the plane side is toward the object, as in this position there is the least dispersion of light.

Another form of illuminator which at the present day is very little used, is the so-called Lieberkuhn. It is a metalic reflector, highly polished and silvered, provided with a sheath which is fastened to the front of the objective. The light from the mirror passes between the object and the circular opening of the stage to the reflector, and is there reflected and condensed on the object; various sizes are used with different objectives. The parabolic reflector is somewhat similar in principle, but is more generally useful, as almost any objective can be used in connection with it. It is fastened to the nosepiece by means of the objective, and is provided with a universal joint. The light is at one side of the stand and is concentrated on one side of the object.

Another apparatus is the vertical illuminator. This is screwed into the nosepiece above the objective, and as now generally made is provided with a thin cover glass, which may be turned on an axis. The light passes into the mounting through an opening in the side of it, and is partially reflected downward through the objective on the object. There is a partial loss of light at the cover glass, and also as the rays from the object pass through it to the eye-piece, but it is not sufficient to destroy a good image. Excellent results have been obtained, which by ordinary means were not possible.

Another illuminator, which, however, has never been in general use, but which from the novelty of its construction is worthy of mention, is Tolles' internal illuminator. It is constructed of a rectangular prism, and is placed between the two front systems of the objective. The light enters at the side of the objective, is reflected at the oblique surface through the front system, and by it concentrated on the object. It gives the best results on highly polished and brilliant objects. I find that on ordinary objects the internal reflections destroy a clear image, but I am at present working to overcome this difficulty, and if successful I have no doubt that it will prove a generally useful illuminator on semi-transparent and opaque objects.

WOMEN IN DENTISTRY.

Through the kindness of Miss Susan B. Anthony, we are privileged to place before our readers the following hitherto unpublished matter from the forthcoming volume (III) of the "History of Woman Suffrage," edited by Elizabeth Cady Stanton, Susan B. Anthony and Matilda Joslyn Gage, and which will soon issue from the book publishing house of Charles Mann, of this city:

Miss Lucy B. Hobbs, of New York, was the first woman that ever graduated in the profession of dentistry. She matriculated in the Cincinnati Dental College in the fall of 1864—passing through a full course of study, missing but two lectures, and those at the request of the professor of anatomy. She graduated from that institution in February, 1866. A letter from the dean of the college testifies to her worth as follows:

> She was a woman of great energy and perseverance. Studious in her habits, modest and unassuming, she had the respect and kind regard of every member of the class and faculty. As an operator she was not surpassed by her associates. Her opinion was asked and her assistance sought in difficult cases almost daily by her fellow-students. And though the class of which she was a member was one of the largest ever in attendance, it excelled all previous ones in good order and decorum—a condition largely due to the presence of a lady. In the final examination she was second to none.

Having received her diploma, she opened an office in Iowa; from thence she removed to Chicago, and practiced successfully. The following letter from Mrs. Taylor (formerly Miss Hobbs) gives further interesting details. Writing to Matilda Joslyn Gage, she says:

> I am grateful to you for giving me the opportunity to place in history the fact of my study of dentistry. I was born in Franklin county, New York, in 1833. You ask my reason for entering the profession. It was to be independent. I first studied medicine, but did not like the practice. My preceptor,

Professor Cleveland, advised me to try dentistry, and I commenced with Dr. Samuel Warde, of Cincinnati, finishing my studies in March, 1861. At that time the faculty of the Ohio Dental College would not permit me to attend, and there was not a college in the United States that would admit me, and no amount of persuasion could change their minds. So far as I know, I was the first woman who had ever taken instruction of a private tutor.

I went to Iowa to commence practice, and was so successful that the dentists of the state insisted I should be allowed to attend the college. Their efforts prevailed, and I graduated from the Ohio Dental College at Cincinnati in the spring of 1866—the first woman in the world to take a diploma from a dental college. I am a New Yorker by birth, but I love my adopted country—the West. To it belongs the credit of making it possible for women to be recognized in the dental profession on equal terms with men. Should you wish any further proof, write to Dr. Watt, who was professor of chemistry at the time I graduated, and I know he will take pleasure in giving you any additional information.

The following in regard to the great struggle in Philadelphia to secure to women their rights in the matter of dental education, is from the vigorous pen of Prof. James Truman, then of the Pennsylvania College of Dental Surgery, now of the Dental Department of the University of Pennsylvania. It is taken in full from the work in question:

The general agitation of the question: What are women best qualified for in the struggle for existence? naturally led liberal minds to the opening of new avenues for the employment of their talents, shared equally with men. Her right to practice in medicine had been conceded after a long and severe conflict. Even the domain of the theologian had been invaded, but law and dentistry were as yet closed, and in the case of the latter, unthought of as an appropriate avocation for women. The subject, however, seemed so important, presenting a field of labor peculiarly suited to her, that one gentleman, then professor in the Pennsylvania College of Dental Surgery, felt it his duty to call public attention to this promising work. In a valedictory delivered by him to the class of 1866, at Musical Fund Hall of Philadelphia, he included in his theme the peculiar fitness of dentistry for women. The question was briefly stated, but it rather startled the large audience by its novelty, and the effect was no less surprising on the faculty, board of trustees and professional gentlemen on the platform.

In the fall of 1868 the dean of the Pennsylvania College of Dental Surgery was waited upon by a German gentleman, who desired to introduce a lady who had come to this country with the expectation that all colleges were open to women. Although informed that this was not the case, he still entertained the hope that she might be admitted as a student of dentistry. She gave her name as Henrietti Hirschfeld, of Berlin. The matter came up before the faculty, and after a free discussion of the whole subject, she was rejected by a majority vote, but two voting in her favor.

In a subsequent interview with Professor Truman, he learned that she had left her native land with the full assurance that she would have no difficulty in "free America" in securing a dental education. She had also the positive sanction of her government, through the then minister of instruction, Dr. Falk, that on condition of receiving an American diploma she would be permitted to practice on her return. Her distress, therefore, at this initial failure was, naturally, very great. The excitement that this application made was intensified when it was rumored among the students that a woman desired to be matriculated. The opposition became very bitter, and manifested itself in many petty annoyances. In the course of a day or two one gentleman of the faculty, and he the dean, concluded to change his vote, and as this decided the question, she was admitted. The opposition of the professor of anatomy, who belonged to the old school of medical teachers, was so manifest that it was deemed advisable to have her take anatomy in the Woman's Medical College for that winter. The first year of this was in every way satisfactory. Although the students received her and Mrs. Truman, who accompanied her on the first visit, with a storm of hisses, they gradually learned not only to treat her with respect, but she became a favorite with all, and while not convinced as to the propriety of women in dentistry, they all agreed that Mrs. Hirschfeld might do as an exception. The last year she was permitted by the irate professor of anatomy, Dr. Forbes, to take that subject under him.

She graduated with honor, and returned to Berlin to practice her profession. This was regarded as an exceptional case, and by no means settled the status of the college in regard to women. The conservative element was exceedingly bitter, and it was very evident that a long time must elapse before another woman could be admitted. The great stir made by Mrs. Hirschfeld's graduation brought several other applications from ladies of Germany, but these were without hesitation denied. Failing to convince his colleagues of the injustice of their action, Dr. Truman tried to secure more favorable results from other colleges, and applied personally to

Dr. Gorgas of the Baltimore College of Dental Surgery. The answer was favorable, and he accompanied the applicant and entered her in that institution. This furnished accommodation for a few applicants. The loss in money began to tell on the pockets, if not the consciences, of the faculty of the Philadelphia school. They saw the stream had flown in another direction, swelling the coffers of another institution, when, without an effort, they could have retained the whole. They concluded to try the experiment again, and accepted three ladies in 1872 and 1873—Miss Annie D. Ramborger of Philadelphia, Fraulein Veleske Wilcke and Dr. Jacoby of Germany. Their first year was very satisfactory, but at its close it was very evident that there was a determination on the part of the minority of the class to spare no effort to effect their removal from the school. A petition was forwarded to the faculty to this effect, and although one was presented by the majority of the students in their favor, the faculty chose to accept the former as representing public sentiment, and it was decided not to allow them to take another year at this college. This outrage was not accomplished without forcible protest from the gentleman previously named, and he appealed from this decision to the governing power, the board of trustees.* To hear this appeal a special meeting was called for March 27, 1873, at which the communication of Professor Truman was read and ordered filed. A similar communication in opposition was received, signed by Professors T. L. Buckingham, E. Wildman, George T. Barker, James Tyson and J. Ewing Mears. The matter was referred to a committee consisting of Hon. Henry C. Cary, W. S. Pierce and G. R. Morehouse, M. D. At a special meeting convened for this purpose, March 31, 1873, this committee made their report. They say:

Three ladies entered as students of this college at the commencement of the session, 1872-73, paid their matriculation fees, attended the course of lectures,

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* As through the influence of Dr. Truman Miss Hirschfeld had first been admitted to the college, he felt in a measure responsible for the fair treatment of her countrywomen who came to the United States to enjoy the same educational advantages. When the discussion in regard to expelling the young women was pending, Dr. Truman promptly and decidedly told the faculty that if such an act of injustice was permitted he should leave the college also. Much of Dr. Truman's clear-sightedness and determination may be traced to the influence of his noble wife, and no less noble mother-in-law, Mary Ann McClintock, who helped to inaugurate the movement in 1848 in Central New York. She lamented in her declining years that she was able to do so little. But by way of consolation I often suggested that her influence in many directions could never be measured; and here is one: Her influence on Dr. Truman opened the dental college to women, and kept it open while Miss Hirschfeld acquired her profession. With her success in Germany, in the royal family, every child in the palace for generations that escapes a toothache will have reason to bless a noble friend, Mary Ann McClintock, that she helped to plant the seeds of justice to women in the heart of young James Truman. We must also recognize in Dr. Truman's case that he was born and trained in a liberal Quaker family, his own father and mother having been disciples of Elias Hicks. —*Editor History of Woman Suffrage.*

> and were informed, by a resolution adopted by a majority of the faculty at the close of the session, that they would not be permitted to attend the second course of lectures. No other cause was assigned for the action of the faculty than that they deemed it against the interest of the college to permit them to do so, on account of the dissatisfaction which it gave to certain male students, etc. * * * The goal to which all medical and dental students look, is graduation and the diploma, which is to be the evidence of their qualification to practice their art. To qualify themselves for this they bestow their time, their money and their labor. To deprive them of this without just cause is to disappoint their hopes, and to receive from them money and bestowal of time and labor without the full equivalent which they had a right to expect.

After discussing at length the legal aspects of the case, the summing up is as follows:

> We, therefore, respectfully report that in our opinion it is the legal right of these ladies to attend, and it is the legal duty of this college to give them, as students, a second course of lectures on the terms of the announcement which forms the basis of the contract with them.

This report was signed by all the committee, and read by W. S. Pierce, one of the number, and judge of the Court of Common Pleas of Philadelphia. It carried with it, therefore, all the force of a judicial decision, and was so accepted by the board, and adopted at once. This left the majority of the faculty no choice but to accept the decision as final as far as these ladies were concerned. This they did, and the three were invited to resume their studies. Two, Misses Ramborger and Wilcke, accepted, Miss Jacoby refused and went to Baltimore.

The most interesting feature of the matter, and that which clearly demonstrated a marked advance in public opinion, was the stir it made in the press. The daily and Sunday papers bristled with strong leaders, the faculty being denounced in no measured terms for their action. To such an extent was this carried, and so overwhelming was the indignation, that it practically settled the question for Philadelphia, and although several years elapsed after these ladies were graduated before others were accepted, when the time did arrive, under the present dean, Dr. C. N. Pierce, they were accorded everything, without any reservation, and the school has continued ever since to accept them. At a meeting of the National Association of Dentists, held at Saratoga, 1869, Dr. Truman introduced a resolution looking to the recognition of women in the profession. The resolution and the remarks were kindly received, but were, of course, laid on the table. This was expected, the object being to make the thought familiar in every section of the country.

These efforts have borne rich fruit, and now women are being educated at a majority of the prominent dental colleges, and no complaints are heard of coeducation in this department of work. The college that first accepted and then rejected—the Pennsylvania of Philadelphia—has a yearly average of seven to eight women, nearly equally divided between America and Germany. Of the three dental schools in Philadelphia, two accepted women, and the third—the Dental Department of the University of Pennsylvania—would, if the faculty were not overruled by the governing powers.

The learned theories that were promulgated in regard to the injury the practice of dentistry would be to women, have all fallen to the ground. The advocates of women in dentistry were met at the outstart with the health question, and as it had never been tested, the most favorably inclined looked forward with some anxiety to the result. Fifteen years have elapsed since then, and almost every town in Germany is supplied with a woman in this profession. Many are also established in America. They have all the usual requisites of bodily strength, and the writer has yet to learn of a single failure from physical deterioration.

The first lady, Miss Lucy B. Hobbs, to graduate in dentistry, was sent out from the Cincinnati college, and she, I believe, is still in active practice in Kansas. She graduated in 1866. Mrs. Hirschfeld, betore spoken of, returned to Germany and became at once a subject for the fun of the comic papers, and for the more serious work of the *Bojan* and *Uberlana und Meer*, both of them containing elaborate and illustrated notices of her. She had some friends in the higher walks of life; notable amongst these was President Lette of the *Trauen-Verein*, whose aid and powerful influence had assisted her materially in the early stages of her effort. The result of these combined forces soon placed her in possession of a large practice. She was patronized by ladies in the highest circles, including the crown princess. She subsequently married, had two boys to rear and educate, and a large household to supervise. She has assisted several of her relatives into professions, two in medicine and two in dentistry, besides aiding many worthy persons. She has established a clinic for women in Berlin, something very badly needed there. This is in charge of two physicians, one being her husband's sister, Dr. Fanny Tiburtius. She has also started a hospital for women. These are mainly supported by her individual exertions. Notwithstanding all these multifarious and trying duties, she practices daily, and is as well physically and mentally as when she commenced. Fraulein Valeske Wilcke of Königsberg has been over twelve years in a very large practice with no evil results; Miss Annie D. Ramborger, an equal time, with an equally large practice, and enjoys apparently far better health than most ladies of thirty.

Dentistry is, probably, one of the most trying professions, very few men being equal to the severe strain, and many are obliged to succumb. No woman has as yet failed, though it would not be at all remarkable if such were the case. The probabilities are that comparatively few will choose it as a profession, but that another door has been opened for employment is a cause for congratulation with all right-thinking minds.

OXYPHOSPHATES AND TEMPERATURE.

A very troublesome obstacle to success in the use of the oxyphosphate cements will often be found in the temperature of the air, an elevated temperature so hastening those chemical changes upon which the hardening of these cements depends as to render their use almost impracticable. This difficulty is likely to occur only in the hotter seasons of the year, and can readily be overcome by placing the mixing-slab, as well as the acid and oxide bottles, in cold water until their temperature has been considerably reduced.

During severe winter weather too low a temperature also gives trouble, the acid and oxide, even when the former is in some excess, forming a powdery mass utterly unworkable, but which melts down into an almost fluid condition when brought into contact with the warmth of a tooth *in situ*. A temperature between 60° and 65° F. secures the best results in mixing oxyphosphate cements.—Litch, in *Dental Cosmos.*

ESSENTIALS OF CAVITY PREPARATION.

1. A cavity should be so prepared and its border so bevelled that when filled the tooth will offer the greatest resistance to mechanical and chemical forces.

2. Complex cavities should be so simplified and their parts made so accessible that the filling material can be readily and surely adapted to their walls.

3. Approximate cavities which extend to the excising edges or occluding surfaces of the teeth should be so prepared and filled that the strength of the operation will be equally divided between the tooth and the filling.

4. The walls of a cavity should have no corners or acute angles, and should when possible form the segment of a circle, and the bevel of the enamel should, as far as may be, conform to the line of its cleavage.

5. Smooth, strong walls, secure anchorage and perfect adaptation of the filling material to the tooth-bone are the essentials of durability.

6. As regards the enamel, it is better to remove too much than too little; as respects the dentine, better to remove too little than too much; and as to the anchorage, it had better be too deep than too shallow.

7. Anchorage should be secured by so combining pits and grooves as to do the least injury to the dentine and give the greatest strength to the filling; and the enamel should, when possible, be supported by living dentine.—Bennett, in *Dental Cosmos.*

HYPERTROPHY AND ITS VALUE IN EVOLUTION.

Mr. J. B. Sutton, after citing a number of more or less well-known cases of hypertrophy, comes to the conclusions that:—(1) In the lowest form of animal life hermaphroditism is the prevailing condition. (2) Cross-fertilization in hermaphrodites is the rule, and may, as with some Myzostomata, lead to division into sexes within the limits of a single group. (3) Sporadic cases of hermaphroditism are far more common in the lowest forms of life. (4) If in mammals both sets of organs grow concurrently, the individual is sterile. (5) Both sets of organs grow equally to a definite period in embryonic life. (6) Reproduction in vertebrates, so far as is known, is impossible unless hypertrophy of one set of organs occurs. The aim of the author in writing this essay is to try and substantiate the doctrine that pathological processes do not exist *per se,* but are in all cases to be regarded as physiological processes in excess. Pathology has so far played a part among the ordinary processes of evolution, that hypertrophied organs have been in some cases inherited.—*Journal of the Royal Microscopical Society.*

FOOD-ACCESSORIES; THEIR INFLUENCE ON DIGESTION.

The results of experimental inquiries on the subject of foods and food-digestion, when scientifically conducted, cannot help being of great practical importance to man, so intimately is his physical perfection and intellectual activity dependent upon his alimentation. Among the results of certain experiments on this subject by Sir W. Roberts, as given in the *Nineteenth Century*, the following will be found of interest:

Man, as the author says, is a very complex feeder; he has departed, in the course of his civilization, very widely from the monotonous uniformity of diet observed in animals in the wild state. Not only does he differ from other animals in cooking his food, but he adds to his food a greater or less number of condiments for the purpose of increasing its flavor and attractiveness; but, above and beyond this, the complexity of his food-habits is greatly increased by the custom of partaking, in considerable quantity, of certain stimulants and restoratives, such as tea, coffee, cocoa, and the various alcoholic beverages, which have become essential to his social comfort, if not his physicial well-being.

But the generalized food-customs of mankind are not to be viewed as random practices adopted to please the palate or gratify our idle or vicious appetite. These customs must be regarded as the outcome of profound instincts, which correspond to important wants of the human economy. They are the fruit of colossal experience, accumulated through successive generations. They have the same weight and significance as other kindred facts of natural history, and are fitted to yield to observation and study lessons of the highest scientific and practical value.

First, with respect to the action of ardent spirits on digestion, experiments were made with "proof-spirit," and with brandy, Scotch whisky and gin; and the conclusion is, that, so far as salivary digestion is concerned, these spirits, when used in moderation and well diluted, as they usually are when employed dietetically, rather promote than retard this part of the digestive process; and this they do by causing an increased flow of saliva. The proportion must not, however, much exceed five per cent.; and gin seems to be less injurious than either brandy or whisky. It was noticed in these experiments that both of these interfered with the digestive process, precipitating the starch more readily, altogether out of proportion to the amount of alcohol they contained, and brandy was worse than whisky; and this circumstance appears to be due to certain ethers and volatile oils in them; and brandy contains a trace of tannin, which has an intensely retarding influence on salivary digestion. Even very small quantities of the stronger and lighter wines—sherry, hock, claret and port—exercise a powerful retarding influence on salivary digestion. This is due to the acid—not the alcohol—they contain, and if this acid be neutralized, as it often is in practice, by mixing with the wine some effervescent alkaline water, the disturbing effect on salivary digestion is removed.

In the case of vinegar, it was found that 1 part in 5,000 sensibly retarded this process, a proportion of 1 in 1,000 rendered it very slow, and of 1 in 500 arrested it completely; so that, when acid salads are taken with bread, the effect of the acid is to prevent any salivary digestion of the latter—a matter of little moment to a person with a vigorous digestion, but to a feeble dyspeptic one of some importance. There is a very wide-spread belief that drinking vinegar is an efficacious means of avoiding getting fat; and this popular belief would appear, from these experimental observations, to be well founded. If the vinegar be taken at the same time as farinaceous food, it will greatly interfere with its digestion and assimilation.

Effervescent table-waters, if they consist simply of pure water charged with carbonic acid, exercise a considerable retarding influence on salivary digestion; but if they also contain alkaline carbonates, as most of the table-waters of commerce do, the presence of the alkali quite removes this retarding effect.

With regard to "peptic" digestion, the results are still more surprising. It was found that with ten per cent and under, of proof-spirit, there was no appreciable retardation, and only a slight retardation with twenty per cent; but with large percentages it was very different, and with fifty per cent the digestive ferment was almost paralyzed. It was also observed that the weaker forms of alcoholic drinks (wines and beer) differed greatly in the influence on peptic digestion from that of the distilled spirits. They retarded it altogether out of proportion to the quantity of alcohol they contained. Port and sherry exercised a great retarding effect. Even in the proportion of twenty per cent, sherry trebled the time in which digestion was completed. It should further be borne in mind that this wine also retards greatly salivary digestion. Sherry, then, is injurious for persons of feeble digestive powers. With hock, claret and champagne, it was also ascertained that their retarding effect on digestion was out of proportion to the alcohol contained in them; but champagne was found to have a markedly less retarding effect than hock and claret, due apparently to the mechanical effects of its effervescent qualities. The quantity of claret and hock often consumed by many persons at meals must exercise a considerable retarding effect on peptic digestion; but small quantities of these wines (and even of sherry) may not produce any appreciable retarding effect, but act as pure stimulants.

With regard to malt liquors it was observed, as with wines, that they retarded peptic digestion in a degree altogether out of proportion to the amount of alcohol contained in them; and, when taken in large quantities, they must greatly retard the digestion, especially of farinaceous food.

Tea, coffee and cocoa were found to exert varying degrees of influence on the salivary digestion. The medium strength of the tea usually drank is estimated at four to five per cent; strong tea may contain as much as seven per cent; weak tea, as little as two per cent. Medium coffee has a strength of about seven per cent, and strong coffee twelve to fifteen per cent; cocoa, on the other hand, is generally weaker, not more than about two per cent; and this may be one reason why it is more suitable to persons with feeble digestions than tea or coffee. Tea exercises a powerful inhibitory effect on salivary digestion, and this appears to be entirely due to the large quantity of tannin it contains; and, in order to diminish as far as possible its retarding influence on salivary digestion, it should be made weak and used sparingly, and it should not be taken with, but after the meal. Coffee, unless taken in very large quantity, has very little retarding effect on salivary digestion; this is explained by the fact that the tannin of tea is replaced in coffee by a substance called caffeo-tannic acid. Cocoa resembles coffee, and has little or no effect on salivary digestion; the use of coffee or cocoa is therefore preferable to that of tea for persons of feeble digestion.

With respect to the influence of tea and coffee on stomach digestion, it was found that they both exercised a remarkable retarding effect. There was no appreciable difference in the two beverages if they were of equal strength; but, as coffee is usually made of greater percentage strength than tea, its effect must ordinarily be greater. Cocoa also had much the same effect if used of the same strength as tea or coffee; but when of the strength ordinarily employed, its effect was inconsiderable. Strong coffee—*café noir*—had a very powerful retarding effect, and persons of weak digestion should avoid the customary cup of "black coffee" after dinner.

Perhaps one of the most unexpected results of these experiments was the discovery that beef-tea had a powerful retarding effect on peptic digestion, as much so as that of a five per cent infusion of tea. Further researches appear to show that this retarding effect of beef-tea was due to the salts of the organic acids contained in it. Beef-tea contains but very little nutritive properties, and must therefore be looked upon rather as a stimulant and restorative than as a nutrient beverage, but it is nevertheless very valuable on account of those properties.

The author holds the view that, in healthy and strong persons, the retarding effect on digestion, observed to be produced by many of the most commonly consumed food-accessories, answers a distinctly useful end. They serve, he maintains, the purpose of wholesomely slowing the otherwise too rapid digestion and absorption of copious meals. A too rapid digestion and absorption of food may be compared to feeding a fire with straw instead of slower burning coal. In the former case it would be necessary to feed often and little, and the process would be wasteful of the fuel; for the short-lived blaze would carry most of the heat up the chimney. To burn fuel economically, and to utilize the heat to the utmost, the fire must be damped down, so as to insure slow as well as complete combustion. So with human digestion; our highly prepared and highly cooked food requires, in the healthy and vigorous, that the digestive fire should be damped down, in order to insure the economical use of food. We render food by preparation as capable as possible of being completely exhausted of its nutrient properties; and, on the other hand, to prevent this nutrient matter from being wastefully hurried through the body, we make use of agents which abate the speed of digestion.

These remarks will apply, however, only to those who possess a healthy and active digestion. To the feeble and dyspeptic any food-accessory which adds to the labor and prolongs the time of digestion must be prejudicial; and it is a matter of common experience that beverages which in quantity retard digestion have to be avoided altogether by such persons, or partaken of very sparingly.—*Science.*

A California paper says that in an old churchyard in that state a cucumber vine is growing over a boy's grave—waiting for another boy.—*Ex.*

DR. J. MARION SIMS' FIRST VENTURE AS A WRITER.

In the latter part of 1844, there came to my office one day a young woman from Lowndes county, who was about thirty years old. She had on a double thick veil, blue, folded double. She could not show herself in the street, so hideous was she. She walked into my office with her face veiled, and said:

"I have heard of your achievements in surgery, Dr. Sims, and I have come to see if you could do anything for me. I was born with a hare-lip, and I am so ugly that I have to wear a veil to prevent my face from being seen by any one, even by my own family."

I said, "Raise your veil, and show me your face." When she did raise it, the sight was horrible. I had never seen such a bad case of hare-lip before. It was sickening. Out from the end of her nose was a little bone—a snout—and from the tip end of her nose there was a small piece of skin, about three fourths of an inch long, looking like a shriveled-up gobbler's snout. She had no teeth, and I could look clear down her throat. Altogether, her malformation was frightful.

I said, "I can cure you in a month."

"You can?" she eagerly replied, as a ray of hope came across her.

I said, "Certainly; I will give you a new set of teeth, so that you can eat like other folks, and whistle, if you want to, and you will know the value of the society and association of your friends."

To make a long story short, in the course of a month she was entirely cured. She had a very presentable mouth, and Dr. Belangee, who was the leading dentist of the town, took a cast of the roof of her mouth, and made her a set of four handsome teeth. When he had finished his part of the work, she was a very presentable person indeed, and really a pretty woman. Her life, of course, was enlivened and revolutionized.

The curing of this woman from Lowndes county was of itself a very small affair, but it was the beginning of one of my little life stories, and plays a by no means unimportant part in it. The plaster cast made by Dr. Belangee for the roof of the woman's mouth was given to me, and for some time it lay on my mantel-piece. Everybody who came in looked at it, and I said, "That is the plaster cast of Miss So-and-so's mouth, of Lowndes county." Dr. Harris, of

Baltimore, the founder of the Baltimore College of Dental Surgery, the first of the kind in this country or the world, and his friend Dr. Lipscomb, came to visit Montgomery in the year 1846. Through the Lipscomb interest in the county and among the wealthy classes, Dr. Harris was called to so many of the aristocratic families that for two or three months he entirely displaced my friend Dr. Belangee. He was a magnificent man, of fine physical beauty, a gentleman of great intellect, great kindness of heart, and a very accomplished dentist. He was perhaps the very best of that day in the world.

One day he strolled into my office. I had been to call on him, and he returned it. Having an eye quick to discern anything pertaining to his profession, he walked up to the mantel, and picked up the plaster cast lying there.

"Doctor, what is this?" he asked, after he had looked it over carefully, and examined the wonderful cast. I gave him a history of the case, as above related. "I will tell you what, Dr. Sims, I would like you to do. I would like you to write an account of it for the September number of my *Journal of Dental Surgery*."

I said, "Doctor, I can't write anything. I never wrote anything in my life."

"But," he said, "write it as you would talk it, or as you have told it to me. That is all; I will risk you."

"I should be ashamed," I said, "to see anything of mine in print. I am counted as a great worker, to be sure, and I always keep notes of my cases; but I can not write. I never wrote anything in my life. It is not my forte."

He insisted, however, and I sat down and wrote a history of the of the case in the simplest manner possible, and gave it to him. I was ashamed of it, however, when I gave it to him. In the course of two or three months after I had written the article, Dr. Harris sent me a number of the *Journal of Dental Surgery*, containing my article, and a little wood-cut illustrating the plaster cast. I read the article, and was ashamed of it, and determined that I would not show it to any of my medical brethren. I arrived at this conclusion because there were a number of *literati* among them; and, though I was not ashamed or afraid to perform any operation before them, or even in the presence of the best of them, still I did not feel that I was competent to write; especially when compared to Ames, or Bowling, or Baldwin.

Bowling was a most voluminous writer. He had written some really valuable and meritorious articles for the medical literature of the country, which marked the era in which he lived, and which have been incorporated into the literature of the profession, especially his articles on the "Endemic Diseases of the South." He had also written on fevers, pneumonia, and had discussed a variety of surgical questions. But the man that I feared was Ames. Of course, I was on the most friendly terms with all the doctors in Montgomery. Ames was a man that everybody respected, but whom nobody loved very much. On the contrary, they were all rather afraid of him. He had the best practice of the country. He was a quiet, dignified, reticent, skillful man, who filled a very useful and prominent place in his profession. His opinion was sought on all questions, and on all occasions of great importance; and no man in high life ever died, in any other physician's hands, unless Dr. Ames was called in consultation.

I liked and admired him, and I also feared him. He was hypercritical, especially in literary matters. I was not afraid to perform any operation before him, because I was a surgeon, and he was not. He took a kindly interest in me and patronized me. He at one time offered me a partnership, but I was too smart to take it. I saw that he had an immense practice, but as I had as much as I could do, and the work was growing, I had only to eliminate the least desirable part of my practice as it increased among the higher walks of life. Dr. Ames was enjoying the full fruition of all that he could have achieved. I knew that, if I accepted a partnership, I would be compelled to do all his country work, which would break me down. As I was doing well enough, I wisely concluded to let well enough alone, and suggested as a suitable partner in my stead another young man in town who had nothing to do, and whom he afterward accepted.

Well, when the Journal arrived I read the article and I determined that Ames should not see it, nor Baldwin, nor Bowling, nor anybody else. I knew that there was not another copy of the work taken in the city. I walked into my library, which, by the way, had increased beyond the seven volumes of Eberle, and stepped up to my book-case, and on a shelf, level with my eye, pulled out a large volume, and put the Dental Journal behind it, standing it up on its edge, behind the books on the shelf, with the flat surface to the wall. I then replaced the book in its proper position. Some months after this, Dr. Ames happened to walk into my office; he had called to make me a social visit, as we frequently exchanged neighborly visits.

After we had talked over endemic diseases and the other topics of the day, he walked up to the book-case, with the inquiry, "Have you got in any new books lately?" I said, "No." I stood there, and he looked at all the books on the shelf, and pulled out with his left hand the very identical one behind which I had hidden the Dental Journal six months before. As he pulled it out, his quick eye saw something in a new cover hidden away. While he held the book with his left hand, he reached up with his right and pulled out the offending Journal, of which I had been so choice, and which I had resolved that no one should see. If anybody had told him, he could not have gone more deliberately to the place and found it. To-day, it is the most unexplainable thing that ever happened to me. He did not look into the large book, but he held in his hand the fresh Dental Journal, and commenced turning over the leaves, one after the other. He had never seen the Dental Journal before, and it excited his curiosity, so that he became very much interested in it, and all the more interested because it was new.

I said to myself, "My God! if he goes on in this way, he will come to the article on the 'Lowndes County Girl's Hare-Lip,' and he will give me fits. I was trembling like a leaf, as I stood there like a schoolboy. Still he stood there, turning over leaf after leaf, and, when he got to where the case was described he did not look up at all, or say a word, but stood there reading it down on the first page, and then on the other page, deliberately reading it through. It just occupied two pages. My heart was in my throat. As he finished the article he stood perfectly still, and I also stood perfectly still, trembling. As he turned around I thought, "I shall get it now."

In a moment he said, "What would I give if I had the faculty of expressing myself in writing like that?"

I said: "My dear doctor, you have lifted a great load from my heart. Here I have been bewildered all this time, and you have frightened me almost to death, and I don't know what you mean."

"I have never read a thing so natural in my life as your description of the case," he replied; "I could not write that way to save my life. What I do write is labored; but what you write comes natural, it seems. Now, let me give you a piece of advice. I have seen you perform many beautiful operations, and many difficult ones, and, as long as you have this power, I advise you to report them for the press. Seeing that you are so timid, and lack confidence in yourself, if you will send your productions to me I shall be very glad to make such suggestions as are necessary, and to return them to you for your consideration." I accepted his generous proposition; and, but for the encouragement that Dr. Ames gave me, I would not have written anything at all; for I was not aware that I possessed any capacity in that direction.—*The Story of My Life.*

THE BEEF-TEA DELUSION.

One of the popular errors of the day is the over-estimate placed upon beef-tea as a food. The truth of the matter is its food value is so small that it can scarcely be classed as such, and we believe that hundreds are literally dying of starvation while being fed upon it. So deep-seated in the minds of the masses is this idea of beef-tea for the sick, that, on the slightest indisposition, it is the first thing thought of, and should the physician fail to order it he is deemed neglectful of the patient's diet. Beef-tea is a stimulant and as such, at times, it may be useful. It may be made valuable, however, as a food, by the addition of sugar or milk, but as generally taken we believe it productive of more harm than good. The excessive labor which it imposes on the heart, liver and kidneys is well known to those who have carefully observed its action. It is believed to be no insignificant factor in the development of Bright's disease, and its tendency to aggravate all troubles of the kidney as well as all febrile diseases, is pretty generally understood. *People's Health Journal.*

DISCOLORATION OF GOLD FILLINGS.

"We learn from the ODONTOGRAPHIC JOURNAL that the result of Dr. S. P. Palmer's researches into the causes of gold fillings becoming discolored seems to establish the fact that iron is the chief agent. Cabbage or other vegetables cooked in an iron pot, or water drawn from an iron tank, accounts for some cases of discoloration. Iron exhibited in combination with the mineral acids, in physician's prescriptions, may also discolor fillings. Dr. Watt once called attention to the fact that the gold-beater's vellum may communicate foreign mineral particles to gold foil. Dr. Palmer's theory will no doubt appear more plausible to the dentist who does not believe in shouldering more than his share of responsibility."

The above is an editorial in the February number of the *Cincinnati Medical and Dental Journal.* Long ago Dr. A. M. Leslie gave it as his opinion, at a meeting of the Mississippi Valley Association, that a certain peculiar coloring on gold fillings was due to a trace of iron in combination with the gold. Either by appointment or private agreement it became understood that Dr. L. and the writer would give the subject special attention. We both became well convinced that Dr. L.'s theory was correct. When preparing gold for crystallization, in former years, we found it necessary to give special care to the removal of all traces of iron, or the coloring referred to would be found on gold fillings in all mouths containing cyanide of sulphur, sometimes called sulpho-cyanogen. We presume this is the same kind of discoloration spoken of above. It is due to iron.—*Ohio State Journal of Dental Science.*

OBSERVATIONS UPON DIGESTION IN THE HUMAN STOMACH.

Direct observations on digestion in the human stomach have been very seldom made, as opportunities for such cannot often occur. Those by Beaumont many years ago are familiar to every student of physiology, and, notwithstanding their lack of completeness and their many imperfections, they served a very useful purpose in explaining many of the processes whereby digestion is affected in this organ. These observations have been supplemented by others; but the results of modern physiological researches have been such, that renewed opportunities to make such direct observations must be of great value. Such a one occurred within the past year in the person of Heinrich Baud, a healthy young man twenty-eight years of age, into whose stomach, in consequence of a stricture of the œsophagus that prevented the passage of all food, a surgical opening five centimetres in length was made. The case passed into the hands of Mr. A. Herzen, the well-known physiologist, who improved the opportunity to make a series of experiments upon the digestibility of certain foods and upon the behavior of the gastric juices (*Kosmos*, 1885, ii. 1, 4). The pepsin secreted by the patient was of unusual quantity, and, what has hitherto never been observed in similar cases, or through the artificial fistulas of dogs or other animals, there was a changeable but often considerable quantity of bile present. These circumstances, however, though complicating the experiments, did not especially affect the results.

The author's methods of experimenting were as follows: A substantial meal was given to the patient at 7 o'clock in the evening, and nothing further was permitted to enter his stomach till the next morning, when experiments at 6 o'clock were begun, first upon the empty organ. After an examination of the juices therein contained, there was introduced the albumen from three hard-boiled eggs, with two to three hundred grams of water, together with three silken nets, each containing eight small pellets of albumen, uniform in size, and regular in shape, and which could be easily withdrawn for examination. These observations through the fistula were made hourly, and one of the nets with its contents removed.

Remarkable and unaccountable conditions were found in which the albumen remained one or even two hours in the stomach without undergoing any perceptible change, notwithstanding the presence of ferment, with which it was impregnated. In these cases the albumen pellets usually retained in their substance precisely the requisite quantity of pepsin for their solution, which, under favorable circumstances afterwards, exactly sufficed to digest them. This furnishes evidence that the pepsin does not act through simple contact alone, and that a given quantity of it can dissolve only a given quantity of albumen, and that consequently the pepsin, by the exercise of its digestive activity, loses its entire potency.

Observations directed toward the ascertainment of the time required for the stomach juices to impregnate coagulated albumen showed that they penetrated about one millimetre during the first hour and three millimetres within the second. It was also learned that the acids were much more active than the pepsin in penetrating the substance. This last fact furnishes a new proof of the presence of a free acid in the stomach-juices. The juices, however, at such opportunities as it was possible to examine them, were sometimes found to be of a neutral action. But, in order to test the action of acid and ferment further, he introduced at times a quantity of soda to neutralize the acid; without, however, materially affecting the activity of the pepsin, although it appeared to somewhat diminish it. It therefore results that pepsin exerts its digestive power almost wholly independently of the acid. The reverse of this, as may be expected, was also found true—that the acids penetrated the albumen in the absence of the pepsin, and, when the pieces of albumen were small, a sufficient quantity was absorbed to digest them.

Another series of researches was made upon the fluids of the stomach, from which it was found, that, on the mornings after fasting, the secretion usually was small, while at such times following the ingestion, during the night, of milk or any fluids containing alcohol, the secretion was greater. During the first hours of digestion the quantity held a definite relation to the volume of substances introduced, while in the fifth hour the quantity was always more abundant, about three or four hundred grams. The first secretion of the morning was in general a somewhat thick, very stringy, more or less clear fluid, which resembled the white of an egg; that obtained during the process of digestion was less thick and less stringy; while that of the fifth hour was turbid, thin, and little or not all stringy.

Of the hundred and forty-two specimens examined, one hundred and seven showed a yellow or green color, more or less intense, and which indicated the presence of bile. It is worthy of note, that, despite the almost constant presence of bile in the stomach, the digestion was not perceptibly disturbed, and analysis of the contents of the stomach during different hours of digestion clearly proved that the activity of the fluids was not impaired by its presence. It was also observed that the entrance of bile into the stomach partook of a sort of periodicity, a less quantity being found during the first two hours of digestion than at the time either before or after, and that the quantity was still less during active digestion, when fluids, especially beer, were taken in.

The hydrochloric acid of the juices during digestion was found, in a mean of eighty-seven examinations, to be from 1.8 to 1.9 per cent in weight of the entire quantity—a somewhat higher percentage than that given by Richet. The acidity gradually increased during the first hours of digestion, reaching its maximum at the third hour, from which time it gradually decreased. A few times the juices were found neutral, and the highest acidity attained was 4.2 per cent.

Since Dr Koch has shown that an acidity equivalent to two per cent of the gastric juices suffices to destroy the cholera microbe, it has been recommended that table-salt should be employed during cholera epidemics to increase the quantity of acid in the gastric juice, and thus prevent the entrance of these germs into the alimentary canal; but from a series of experiments it was ascertained that the direct reverse was the result, and that the larger the quantity of salt introduced, the more considerable and permanent was the decrease of the acidity, so much so that at times the juices were rendered entirely neutral. Contrary to the opinions which have been expressed by physiologists, that salt increased the activity of the secretion of pepsin, experiments seemed to prove that it hindered such secretion, and when large quantities were taken, either into the stomach or by injection, the stomach digestion was most impaired. Mr. Herzen, however, would by no means deny the probability that salt injected directly into the blood increases the secretion of pepsin. On the other hand, it was established that the introduction, either by the stomach or the rectum, of some good peptogenic substance, such as broths or dextrine, uniformly hastened digestion in the stomach, and that this resulted independently of the increase of acidity, and despite the frequent presence in the stomach of the contents of the duodenum. In other words, the digestion may be hastened, and a richer secretion of pepsin brought about, by their use; while others, such as tea, wines and grape sugar, produce no effect whatever. Of the practical results of such observations, corroborating and adding to, as they do, conclusions previously and in other ways arrived at, there can be no doubt. Those who would aid an impaired digestion may seek in certain foods, such as broths, stale bread, milk or coffee, taken a while before regular meals, efficient helps; while alcoholic drinks, and especially the sour wines, sugars, and others, may be not only of no use, but even actually prejudicial. To the child and the invalid the results are no less useful.

CONDUCTOR'S DEPARTMENT.

DENTAL SOCIETY OF THE STATE OF NEW YORK.

The above Society will hold its eighteenth annual meeting in the Assembly parlor, at Albany, Wednesday and Thursday, May 12th and 13th, 1886.

The Society will be called to order at 10 A. M., Wednesday.

Members or others who desire to present papers, the titles of which do not appear in the published programme (which will be issued on or about May 1st), should so inform the Chairman of the Business Committee, Dr. M. E. Elmendorf, Greene Avenue, Brooklyn, as soon as possible before the meeting.

Persons intending to compete for the "Whitney Memorial Prize" must have their essays in the hands of the Chairman of the Committee on Prize essays, Dr. L. S. Straw, Newburg, at least ten days before the meeting. The envelope containing the essay should be marked, "For the Whitney Memorial Prize." The name of the writer may accompany the essay, *but in another and sealed envelope.*

The Secretaries of the several District Societies are requested to forward their reports to the Secretary of the State Society by May 8th. It is desired that the reports be made as complete as possible, including name and address of each member in good standing.

Persons who wish to exhibit appliances, materials, etc., should correspond with Dr. E. C. Baxter, Albany, who will provide the necessary accommodations.

The Board of Censors will meet Tuesday morning, May 11th, at 10 o'clock, for the examination of candidates for the degree of "Master of Dental Surgery" (M. D. S.). No examination will be held during the meeting of the Society. Information as to the requirements of the Board may be had by addressing the Secretary, Dr. Frank French, Rochester.

The Committees are as follows:

Arrangements—E. C. Baxter, S. C. French, A. C. Rich.
Publication—J. Edw. Line, F. French, W. C. Barrett.
Dental Law—Wm. Carr, A. M. Holmes, C. E. Wheeler.
Ethics—O. E. Hill, Chas. F. Ives, G. L. Curtis.
Business—M. E. Elmendorf, E. D. Downs, J. J. Pitts.
By-Laws—B. Rathburn, Hymen Rosa, M. H. Smith.
Prize Essays—L. S. Straw, A. H. Brockway, J. N. Race.
Dental Practice—F. D. Nellis, B. T. Mason, M. D. Jewell.
Transactions—E. L. Swartwout, W. W. Walker.
Preceptor and Pupil Contract—E. Parmley Brown, W. C. Barrett, W. C. Stewart.
New Quarters—E. C. Baxter, C. F. Wheeler, Chas. Miller.

THE ODONTOLOGICAL DINNER.

According to "Notice," the Annual Dinner of this Society was given February 10th, at the Hotel Brunswick, New York—one hundred and twelve guests, "personal guests," resident, non-resident and honorary members, sitting down to what was pronounced "a marvel of gastronomic skill."

President E. A. Bogue delivered a brief address; Dr. J. Smith Dodge responded to the only toast of the evening, "the New York Odontological Society;" Dr. N. W. Kingsley, of the entertainment committee, read letters and telegrams of regret from gentlemen unable to be present, and later, pleasantly introduced in prearranged order each of the several members and guests whose contributions to "the flow of soul" enliven the pages of the first half of this number of the ODONTOGRAPHIC JOURNAL, the only periodical, by the way, to receive and publish the complete official report of all that was said and done on this occasion.

The whole affair was of course most admirably managed, even to the disposition at the tables of members and guests, every one of whom found himself in most congenial company, and, in many instances, flanked on both sides by old-time friends. The committee, consisting of Drs. Kingsley, Brockway and Woodward, worked at this part of the programme from noon till half after five o'clock, again and again revising the same on receipt of each belated letter or telegram of regret. Another fact should be mentioned, as showing great attention to detail—the list of those present was revised, the printer's proof corrected, the cards struck off, and distributed by the committee while the Society and its friends dined.

AMERICAN DENTAL ASSOCIATION—CHICAGO OR SAN FRANCISCO?

The topmost question at the present time with members of the American Dental Association is—Where shall the meeting of '86 be held?—the choice being between Chicago and San Francisco. Circulars giving all that it is important to know have been received; but because of their number and length, and the limited space at our disposal, they are here merely noticed and not, as requested, published in full.

Dr. Crouse, Chairman of the Executive Committee and Committee of Arrangements, presents the Chicago side. This he says he does in the interests of the whole membership, most of whom can and will attend the meeting if held in Chicago, but who cannot or will not, for financial and other reasons, go to San Francisco. Then, for the benefit of those who desire to go to San Francisco, he offers the assurance of railroad authorities that an excursion train will be run from Chicago immediately on the close of the meeting. Dr. Crouse is backed by the Chicago Dental Society, a majority of whose members are anxious to secure the meeting for their city.

On the other hand, Dr. Dudley shows that the greater number of prominent and influential members of the Association prefer to go to the Pacific coast. Those from whom he has received letters in regard to the subject exhibit an enthusiasm that not only guarantees their own attendance but also promises to induce into going many who are now somewhat indifferent as to the place of meeting. To Dr. Crouse's excursion scheme Dr. Dudley objects on the ground that August, particularly the latter half, is a wretched month in California, and further, that it would carry the time beyond the days of cheapest rates and into the busy season following the annual vacation.

Of course the California dentists are full of hope and expectation, and if the opportunity is given them will make the trip both pleasant and profitable to all who may go.

We refer those who wish to get the news to date in regard to the subject to the circulars published in the current number of the *Independent Practitioner.*

FIFTH DISTRICT ENTERPRISE—OFFICERS.

At its annual meeting, held a few days since, this Society determined with commendable zeal to make itself known as widely as possible, and to this end managed to have the following appear as telegraphic news of the Associated Press:

> Rome, April 14.—The Fifth District Dental Society concluded its session here to-day. Officers were elected as follows: President, Dr. A. L. Curtis. Syracuse; Vice-President, C. H. Bennett, Waterville; Recording Secretary. Dr. C. J. Peters, Syracuse; Treasurer, Dr. A. R. Cook, Syracuse; Correspondent, Dr. B. T Mason, Phœnix; Librarian, Dr. A. Potter, Utica; Censors, Drs. Parmer, Barnes and Swartwout. The next semi-annual meeting will be held in Syracuse, the fourth Monday in October.

ELECTION OF OFFICERS OF THE CHICAGO DENTAL SOCIETY.

At the annual meeting of the Chicago Dental Society, April 6th, the following officers were elected for the ensuing year:

President,	Dr. Frank H. Gardiner.
First Vice-President,	Dr. P. J. Kester.
Second Vice-President,	Dr. W. B. Ames.
Recording Secretary,	Dr. J. G. Reid.
Corresponding Secretary,	Dr. A. E. Mattison.
Treasurer,	Dr. E. D. Swain.
Librarian,	Dr. A. W. Harlan.
Board of Censors,	Dr. L. L. Davis. Dr. J. W. Wassall. Dr. B. L. Rhein.
Board of Directors,	Dr. Geo. H. Cushing. Dr. J. A. Swasey. Dr. E. Noyes.

A. E. Mattison, Cor. Secretary.

SEVENTH DISTRICT MEETING.

The Seventh District Dental Society of the State of New York will hold its eighteenth annual meeting in Powers' Hotel, Rochester, N. Y., on Tuesday and Wednesday, April 27–28th, 1886. It is the aim of those in charge to make this meeting one of unusual interest. Members of the profession are invited to be present. The meeting will be called to order at 2 P. M., April 27th.

CHAS. T. HOWARD,
224 E. Main St., Rochester, N. Y. Recording Secretary.

CHICAGO AND THE SECTION OF DENTAL AND ORAL SURGERY.

The following resolution was adopted at the January meeting of the Chicago Dental Society, and the Corresponding Secretary instructed to transmit a copy to your journal for publication.

Resolved, That this Society endorse the action of the Conference at Buffalo as regards the International Medical Congress.

The action is embodied in the following resolution:

Resolved, That we as members of the dental profession deem it inexpedient to recommend the organization of a Section of Dental and Oral Surgery in the International Medical Congress of 1887 under the present circumstances.

P. J. KESTER,
Cor. Sect'y Chicago Dental Society.

PELLETS.

"The inside works of a sausage, tra-la,
Have nothing to do with the case."

Dr. G. C. Daball's present address is 14 Avenue de l'Opera, Paris.

The Chicago college of Dental Surgery announces a spring course of lectures beginning April 6th and ending June 15th.

The fourth annual commencement exercises of the Dental Department of the Iowa State University were held at Iowa City, Monday, March 1st, '86. The annual address was delivered by Rev. Dr. A. B. Robbins, of Muscatine, and the valedictory by W. J. Brody, of Iowa City.

The Indiana Dental College issues a very neat announcement. This College is evidently pushing for a place at the front.

Dogophobia still thrives in some of our eastern cities, a new scare occurring almost daily. This mad-dog or dog-mad business should be helped on until every mother's son of this relic of the Indian village lives only in the memory of the oldest inhabitant, and on the shelves of our dusty museums of natural history. Like the rascals of the party forninst us, the dog must go. That is to say, we'd like to have him go, and stay when gone.

The following was received by an expert in the mechanical treatment of oral deformities. The "clift" was not wholly confined to the "ruff of me mouth:"

DEAR SIR:—Being inform By — — ——— that you treat on clift Palate as I wish a Palate and — — ——— say it is a clift Palate that I need There are other here who need a Palate and one who need a Roof to Her nouth and I wish to know the cost of of a clift Palate. So please send ne the cost of one.

——— — ———.

Dr. E. Parmly Brown has put on the market a moose-hide disk for polishing teeth, fillings, etc. When wet they carry emery, pumice, chalk or other polishing powder, and adapt themselves well to irregular surfaces. They are so cheap that even the dentist of small means may comply with the demands of decency and use them but once in a given case. When they have answered their purpose in the mouth they may be laid aside for coarser work on metal plates, crowns and bridges. The Rochester Dental Manufactory has a full line of them in assorted sizes.

The *Medical Record* says Prof. P. R. Edes Jackson recently gave one of a series of lectures on the professions to the students of Harvard College, presenting the subject of success in the medical profession, etc. "Prof. Jackson does not seem to have described the opportunities offered by the medical profession to the educated men in strong enough light. We believe that there is no better opening than medicine for thoroughly educated young men, who have any kind of aptitude for getting along.

"Prof. Jackson is mistaken also in saying that medicine necessarily requires an entire and exclusive devotion beyond that demanded by other pursuits. This is an old commencement oration myth, and it is time it were laid on the shelf."

Another venerable chestnut gone to seed, and seed growing scarce.

The *Central Tennessee College Record*, published at Nashville, has the following:

Arrangements have been completed for establishing a school in Dentistry, in connection with Meharry Medical College. It will be under the direction of a graduate of the Dental Department of Vanderbilt University, and it will open on the first Monday in October. The requirements for admission will be the same as for medical students. It will require two years to complete the course, and the tuition will be thirty dollars per session.

"Meharry" is a Central Tennessee college, an educational institution of color.

The following throws some light on what may be said to constitute, in part at least, the "editorial function:"

Mrs. Burnett has written nothing for *The Century* in nearly four years and "Stylus" in the *Literary World* thus explains it: "When Mrs. Burnett sent the last chapters of 'Through One Administration' to *The Century*, the editorial censor of the magazine, fearing to shock some of his squeamish readers, who, however, were asked to swallow 'The Bread Winners,' took the liberty of making important changes in the denouement of the story without consulting the author. Mrs. Burnett was highly offended, holding with Thackery that an editor has the right to make verbal changes in an author's work, but no right to rub his ears over the manuscript."

In the *Ohio State Journal of Dental Science* for March Dr. E. S. Talbot briefly considers Dr. E. A. Bogue's "Effects of Amalgam Fillings," etc., published in this journal last January. Dr. Talbot appends the following statement, which may be regarded as merely corroborative, and not at all conclusive:

"I present to you the case of a young woman 33 years of age, Miss S———, of Lake Forest, Ill. When she first came to my office fifteen years ago, I found a few amalgam fillings in her teeth and filled several posterior teeth with amalgam. For several years she had been treated by her physician for sore throat. She consulted me in 1884, in regard to her teeth, and I then noticed the usual symptoms of murcurial poisoning; the red line along the gum was very marked, and the flow of saliva excessive. I gave her my opinion of the case and told her I thought the sore throat was produced from the same cause, and suggested that the amalgam fillings be replaced by gold, which I commenced doing October 27th and finishing

November 22d, 1884. From that time her throat began to be better, and she gradually improved until when I met her this winter she was free from all ailments, and better than she had been for years."

Xerxes Smythe, an aged colored man of Shotgun county, Tex., when a boy ran a needle into his hind foot. The accident caused him no serious annoyance and was forgotten. A few days ago Xerxes felt a sharp pain in his left wrist and, when an incision was made, much to his astonishment, a paper of needles worked their way to the outer world. The needles were two dozen in number, and were neatly done up and labled.

Miss Samanthy Adams, of Adams, Adams county, Mass., two years ago swallowed a campaign lie. She thought little of the matter at the time; but a few days ago she was seized with violent convulsions. The family physician was called and finally extracted from the lady's right arm a copy of a Mugwump paper dated October, 1884.

Little Willie Perkins, son of the postmaster at Perkinsville, Neb., swallowed a dollar two years ago, and day before yesterday he extracated from his left ear a dollar and twelve cents, the twelve cents being interest on the dollar at six per cent. per annum.—*Chicago Rambler.*

THE
Odontographic Journal.

VOLUME VII.—*July, 1886.*—*No. 2.*

ANNUAL ADDRESS.

BY PRESIDENT FRANK B. DARBY, D. D. S., ELMIRA, N. Y.

GENTLEMEN:—Another year has been added to the life of this Society, and it is with the happiest feelings that I greet you upon this eighteenth anniversary, but coupled with it is a warranted embarrassment, fearing I may fall far short of your expectations as presiding officer, and I ask of you the same kindness and consideration during the deliberation of this meeting that you so generously bestowed in conferring upon me the highest honor which you could give. The year just passed has been a busy one to you as professional men, for in this day of wonderful progression, new theories are constantly being advanced; and it requires no small amount of research to keep abreast of the times, and put to a practical test all that is demanded of you.

Many false theories have undoubtedly been demolished, while the practical ones have been strengthened and developed.

So, with minds stored with useful knowledge, we have again assembled to record the experiences of the past, relying upon true fraternal intercourse for encouragment and stimulation. And as we review the past, we instinctively look forward into the future, knowing there is yet much hidden, which in time will be revealed, and our store of intellectual attainments increased.

It is a fact beyond question that the profession's greatest need to-day, is intelligence. Our manipulative skill has outrun our scientific attainments. Our ranks are full of skillful men who do honor to their calling as operators, but for want of time, in the hurry and activity of practical life, seem to ignore the importance of scientific research, and are evidently satisfied with the accumulation of dollars and cents. This truth is demonstrated by the comparative small numbers who are members of this representative body. While New York state has more dentists than any other state in the Union, the number who annually leave the operating room for two days of recreation and profit are comparatively few. The inspirations for higher attainments are rarely ever acquired at home; contact with fellow practitioners is the great stimulator, and he who ignores the society of his profession, is quite apt to be found in a rut, which time will deepen.

In looking into the future, I see much which this society has to accomplish. Our dental law is still defective, or at least inoperative. In corresponding with members of the district societies, I find there are county clerks who fail to interpret our registry law ; in one county it is ignored entirely, any one being allowed to register who presents himself and pays the fee ; while other counties throw aside the list of reputable colleges, and ask simply for a diploma. Something should be done to protect the registry.

The initial step taken last year, by appointing a committee to secure a better and permanent room for our meetings, was an important one, and I congratulate them upon their success so far. I heartily accord with the suggestion of my predecessor that we need better accommodations than we have had in the past. The dealers and manufacturers who make exhibits should be under the same roof with us, as the separation is liable to detract from the interest of the meeting by members visiting them during session hours.

As a country practioner, and one of the many who has so little, and wants so much, I have been impressed with the idea that the great State of New York ought to support a dental hospital, free and independent, where any member of the profession could go for advice and consultation, or take his patient for treatment, and feel that he was not imposing upon his fellow practioners. Such an institution, although small, would be of the greatest benefit to many, and possibly a blessing to all. No city in the Union affords greater talent or facilities than New York, and I throw out this hint, hoping it may create a spark of enthusiasm which in time will kindle and develope into a grand undertaking which will not only be the pride of our profession in this state, but a blessing to mankind. As we have much to do with micro-organisms, it would be exceedingly appropriate for this society to be the first to demonstrate the existence of a hospital germ.

During the past year the ranks of our profession have been broken by the death of two of its honored and well-known members, Dr. S. C. Barnum, known throughout our professional world as the inventor and generous donor of the rubber jaw, and Dr. John Riggs, who acquired greater skill in the treatment of his specialty than any other man, and was the first, I believe, to contribute it intelligently to the profession ; and I say all honor to such men, who, by scientific research or inventive skill, have done honor to their calling, and added much to the alleviation of human suffering. This society can do no less than to place upon its records a proper recognition of their merits.

It is with satisfaction that I am able to announce a flourishing condition of our district societies. Some of them are increasing in membership, and there seems to be a growing interest in society work. The uniting of two districts at the semi-annual meetings has proved advantageous to both, and is recognized as a means of benefit and enjoyment. Nothing practical can be suggested that will increase the membership, unless it be a personal effort on the part of each member to add a new name to the roll.

It is a lamentable fact that so great a majority ignore, or fail to recognize the importance of contact with their fellows. There seems to be an impression among outsiders that societies are run by cliques ; which is absurd, because they are run by the men who attend them, and the membership is constantly changing. Nothing will pay a young man greater, or give him better standing at home, than to be identified with them, for the people at large look upon all societies as progressive and recognize their importance. Professor Winder paid us a great compliment when he said the whole country holds this society in high esteem. It is a fact that the eyes of the profession are upon us, and the power of our Board of Censors more or less criticized. Let us so demean ourselves that we will not only command attention, but respect and encouragement.

I am confident, gentlemen, that you fully realize the importance of these annual gatherings, and have gladly thrown aside the routine of office life, and come to this session determined to make it an interesting and enjoyable one. Let there be no wasted time ; let promptness and dignity characterize the discussions, and all will go away refreshed and satisfied.

PHYSIOGNOMICS IN DENTAL PROGNOSIS:

A Study of Temperamental Attributes from the Physiological Standpoint.

BY MYRON D. JEWELL, D. D. S., RICHFIELD SPRINGS, N. Y.

[Read before the Dental Society of the State of New York, May, 1886.]

Apropos to our subject, Fothergill, in his "Hand Book of Treatment," under the head of "Diathesis," writes: "There are few things of more importance in actual practice, than a fairly good appreciation of the varieties of diathesis, and of the tendencies given by each, together with a knowledge of the therapentic indications so furnished."

"Study well the physiognomy of disease," writes Laycock. "All those external characteristics in the patient that reach the unaided senses * * * * whether they be sounds or odors, or visible or tangible modifications of form, complexion, expression, and modes of functional activity."

The study of the temperaments is not a new thought by any means. But upon the subject of temperamental attributes and their influence in the treatment of general or local pathological conditions, so far as my observation has extended, comparatively little has been written. Besides the author first quoted, Professor Laycock, of Edinburgh, and Mr. Johnathan Hutchinson, of London, have made the most notable attempts in this direction. The latter gentleman researches in the direction of the modifications of inherited syphilis, especially in the development of the teeth, are well known. The study of the temperaments persued by these gentlemen, and by nearly all writers upon the subject, whose work has come to the writer's notice, has been from the standpoint of their pathognomic indications. It is the physiological aspect of the subject that I shall endeavor to present to you to-day.

A knowledge of the influence of the temperaments upon the physical economy, in promoting or retarding natural recuperative processes, materially enhances the value of the services of the "old family physician." By long association with the family, he comes to "know the constitution" of its individual members. This is one of the principle features of the subject we desire to make prominent, namely: that, with the principles of physiognomical diognosis thoroughly mastered, a young practitioner may be able to treat a case quite as successfully as the "family doctor," barring, of course, any cachexial idiocrasy or idiosyncrasy. So that it is eminently desirable that all students of medicine, whether specialists or in general practice, shall familiarize themselves with those external indications which are characteristic of constitutional conditions.

For the present study, a broad mark of distinction should, however, be drawn between what we have denominated the *pathological* and the *physiological* phases of the subject. Were we to study the former, we should be obliged to divide the temperaments into *five* distinct classes of *diathesis*, considering the various constitutional indications in the light of their evincing in the individual a *predisposition* to disease; such as, for instance, the *strumus* diathesis, or the *gouty* diathesis. But, as has been intimated, it is our purpose to study the latter phase of the subject, and draw our inferences from the investigation of the various temperamental attributes as indications of inate power in the individual to combat and *resist* disease. So that, though analogous, there is seen to be a marked dissimilarity between the temperaments as we understand them, and "Diathesis."

Having defined our position, let us consider the temperaments from the Physiological or *Dental* standpoint:

"The animal creation," says Dr. White, "is divided into kingdoms, sub-kingdoms, classes, orders, families, genera, species. A further or sub-division, includes in minor groups, individuals whose salient characteristics are correspondent or similar. Thus every living creature has certain physical peculiarities by which its position in this classification is determined. Man, as the head of the animal kingdom, besides having his place in this general scale, is distinguished by a still finer classification, under the denomination of temperament—an association of several distinguishing characteristics, such as size and form of body, complexion, color of eyes and hair, and to a certain extent, the disposition and character of the individual." And quoting still further, the same author, in definition of the term, "Temperament may be defined as a constitutional organization, depending primarily upon heredity—national or ancestral, and consisting chiefly in a certain relative proportion of the mechanical nutritive and nervous systems, and the relative energy of the nervous functions of the body."

From the physiological point of view, temperaments are divisible into a primary and secondary classification. The primary or *basal* types are four in number, and known as Bilious, Sanguinous, Nervous, Lymphatic. Pure specimens of either of the basal classes of temperament are exceptionally rare, especially in this country, when often the temperaments are so combined as to require the nicest discrimination to decide to which class a certain individual case belongs. The admixture of the characteristics of three or four of the primary classes, results in what are termed ternary or quarternary combinations, as the case may be. These latter classes are so infrequent, however, as not to come within the scope of our subject or the general classifications referred to.

The second series or classification of temperaments, includes those cases where two of the basal types combine to form what are denominated *Dual* or *Binary* temperaments. It is comparatively infrequent that a given case can not be diagnosed by the aid of a thorough knowledge of the peculiarities characteristic of the four classes into which the basal temperaments are divided.

Binary or dual temperaments may be designated as a combination or coupling of two of the basal types, as bilio-sanguine, nervo-sanguine, bilio-nervous, and so on through the whole group. Each of the primary divisions in turn, as a basal type, modified by one of its fellows ; as, in the bilio-sanguine, the sanguine would be the strong or basal type, modified or qualified by an admixture of the bilious. Thus, taking for example the bilious temperament as a base, we have, as the first three of the twelve divisions of the second classification, sanguo-bilious, nervo-bilious, lymphatico-bilious.

That the differentiation of temperaments is primarily dependent upon heredity, national or ancestral, or both, is beyond question. Yet it is equally certain that the relative energy of the various functions of the human economy predispose the combination during inter uterine life. The relative energy or preponderance of either of the functions of digestion, assimilation, circulation, respiration or innervation, together with the influence of ones *environment*, it seems reasonable to believe, would be quite as powerful agents as the ancestral or national type or impression ; for it cannot be disputed that a line of posterity is frequently broken in upon in this regard, and radical innovations made upon the ancestral Type. "Lugol asserts that scrofula was rampant in the third generation of those who entered Paris as perfectly healthy provincials." And in a cosmopolitan population like that of the United States, we find even *national* or tribal types gradually but *surely* becoming obliterated.

We daily meet examples of modified ancestral and national types that are not occasioned by a mingling of races, notably in the case of the Jewish race in America.

Thus it is that, excepting the *aboriginal*, we have no national or *American* type of temperament. Whereas, the lymphatic Teuton, the nervous Frenchman, the strongly bilious descendant of Cæsar's plebians, or the sanguinous son of Erin, are types well known and readily recognizable. While on their native soil, these types remain unchanged for ages; but migration to other climates, and development under other and different external conditions, *modifies* the type; thus demonstrating the influence of *environment over* national or ancestral heredity in the differentiation of temperament.

Not only are the temperaments classified and arranged in accordance with their external, visible or tangible characteristics, but they are found to indicate the *physical status* of the individual, a clear conception of the indications thus presented, aiding materially in the prognosis as well as the diagnosis of a given case. As the four basal temperaments form the foundation for the superstructure of the second or dual divisions, so will an understanding of the distinctive features of the primary division enable us to recognize and classify the various admixtures that come under our observation.

In order that we may gain an advantage from this study, it becomes necessary to familiarize ourselves with the distinctive features of the primary types first, and then pass to a study of the secondary classification. Briefly, then, the bilious temperament is indicated by a general form, tall, massive, square-built, possessing a steady and persistant movement, a brownish yellow skin indicating a tendency to bilious disorders; not generally inclined to corpulency, but endowed with strength, fortitude, endurance, and wonderful tenacity of purpose. In disposition despondent, and tending to melancholy. Hair course, straight and black, often inclined to curl; eyes of average size, black and piercing; teeth strong, and well articulated, of a bronze yellow color and only slightly narrower at the neck—nearly the same size from neck to cutting edge. These are among the most difficult teeth to extract, by reason of the density of the periosteum and alveoli. In all maladies in the bilious, attention should be directed to the liver, and a good discharge of bile maintained. Alkaline purgatives may be used, and assimilation will be accellerated rather than retarded by their employment. From the Dento temperamental standpoint, the bilious temperament may be considered as one possessing internal attributes of strength, endurance, persistence and good recuperative power.

In the consideration of the next of the basal types, we discover an almost exact autithesis of that which we have just studied, in its general physiognomical characteristics. The sanguinous temperament is indicated by a strikingly full habit of body, a robust and well rounded contour, an easy and graceful carriage, a florid complexion and warm, dry skin. Hair of a light chestnut to sandy, and large, clear, round blue eyes. The teeth of the sanguine individual are well proportioned, of a creamy yellow color, with well rounded outlines. The form of the arch is characteristic, and unlike either of the other divisions, corresponds with the generally rounded form of the teeth, in being of a decided horseshoe form, without angles at the cuspids. And owing to the rotation of the jaw in mastication, the teeth in middle life, articulate square on end, and, by abrasion, present the appearance of "double teeth all 'round," as we often hear our patients remark.

Individuals possessing these indications are of a hopeful, aspiring disposition, but are inclined to impetuosity and are lacking in the element of self-control. The indications from the Deutal standpoint in the study of the sanguine temperament are dense structure of teeth, abundance of nutrition, and reliable recuperation ; furnishing a class of people who boast that they "never took a dose of medicine in their lives ;" whose nervous systems are not easily disordered, and whose digestive powers are of a high order.

The third division of the primary classification of basil temperaments has its peculiar features quite as marked as any of its fellows, indicative of a type of temperament that is rapidly increasing in frequency, and is destined, I believe, to become the prevailing temperament if not the future National American type. In private and in public life, on the street, in the car, and especially in any large assemblage of individuals, one has but to look about him to be convinced of the truth of the statement

Persons of a nervous temperament are rarely of great bulk. Their osseous framework is delicate, but erect and well proportioned. The muscular development is slight but well defined, possessing more power than mere size would premonstrate. Their general movement is rapid, restless and unwearying, fitful ; senses acute, and no matter what they may be doing, they always seem able to do more ; requiring comparatively few hours sleep, while the chylopoietic viscera are not rarely unequal to supplying the demand upon the nutritive processes. Complexion usually dark, with grayish tint; hair brown and wavy, inclined to curl; eyes above average in size, dark brown; teeth transparent pearl blue, fine long cusps and cutting edges, in form generally long as compared with those of the sanguine type, narrow at the neck and increasing in width to the cutting edge. This class furnishes those individuals that display what are termed *idiocyncrasis*, are remarkably susceptible to *faith cures*, and are an "exceedingly difficult class of people to treat, often defeating the best laid therapentic schemes by their peculiarities;" and, continues Fothergill, "Furnishes predisposition to insanity, anomalous hysteria, to eccentricity, to vinomania, to epilepsy and to chorea. In practice, the recognition of a nervous element in the constitution is a great step towards appropriate and successful treatment."

Notwithstanding all thes adverse indications, the nervous temperament possesses most remarkable recuperative power. Not infrequently pulps die and become in a degree mummified, without giving trouble when protected by fillings; indicating a property of *resistence*, rather than reliability. The structure of the teeth is dense and well organized.

Appreciating the elements of the nervous organization, one readily learns to anticipate results, and "Tempers the wind to the shorn lamb," by a sedative course of treatment both in *manner* and medication, often achieving a reputation for skill in the estimation of *that* patient at least, far above that of his less fortunate brother practitioner. Stimulative treatment is contraindicated in the nervous temperament.

In the study of the next and last of the four primary types, we find it to be the antithesis of the nervous. Where stimulative treatment is contraindicated in the latter, it is usually found essential in nearly all pathological conditions of the former. Instead of the slight, agile, energetic, nervous individual, the opposite is presented in the heavy, massive, clumsy, loose-jointed, deliberate lymphatic type, whose loose and ill-defined muscular development bespeaks a sluggish and inert systemic condition generally. A palid, muddy complexion, skin cold and clamy, and an expression of constitutional weariness pervading every movement. The hair is course, straight, light or inclined to lead color; small gray or grayish eyes, lacking in expression; the teeth are characteristic, maintaining the same palid tint of the complexion ; are large, with thick necks, and cutting edges with poorly defined cusps, and in general form broad and rounded latterly, and loosely fixed in the jaw.

Persons of this temperament are of a decided hemmorhagic diathesis ; indeed, the entire secreatory system is active, and in the treatment of nearly all pathological conditions, the system requires a general spurring up, a whipping into the traces, as it were, by a general stimulative course of treatment. Slow at recovery and of a low order of recuperative power.

In the cursory glance at the chief characteristics of the four basal temperaments we have taken, it has been impossible to go into minute details. But a mastery of the points we have given will enable us to appreciate and classify the temperamental attributes of our patients, and by the aid of such knowledge, determine not only the course of treatment best to pursue in a given case, but also what the probable termination will be, *all things being equal.*

The foregoing physiognomical characteristics of the primary classification of temperaments is the foundation upon which all study of dual or mixed temperaments is based. And the profession are indebted to Professor Flagg for the result of his studies in this direction placed on record in his series of valuable articles on Dental Therapeutics, published in the *Dental Cosmos* a few years ago ; and later, tabulated for more ready reference by Dr. White, of the same journal. Beyond the efforts of these gentlemen, it has not been the good fortune of the writer to discover any work of note bearing upon this division of our subject.

Modifications of basal temperaments would be indicated by modifications of their physiognomical peculiarities. Anomilies occasionally presenting themselves wherein the most critical knowledge will be inadequate to a correct classification without study. A thorough understanding of these basal features, however, is ordinarily quite sufficient to enable the observer to make his classification without difficulty. A study of each of the twelve divisions of the Binary temperaments would occupy more time than is allotted me in the presentation of this subject. Yet the fact of the infrequency of an unmixed temperament requires that we should possess some idea of the method of distinguishing them. Sanguo-bilious, nervo-bilious, lymphatico-bilious, are the first three divisions. In these the bilious characteristics predominate, modified in turn by the temperament with which it may be united. Having in mind the distinctive features of the bilious, we recognize them at once, and consider the indications "excellent" in proportion as they may be modified. The general form of osseous and muscular development, complexion, color of hair and eyes, shape, position, color and density of the teeth, all uniting to aid in determining to which class the individual belongs.

Bilio-sanguine, nervo-sanguine, lymphatico-sanguine, are the second group. The same rule in classifying applies in these combinations ; and though the first combination in this sub-division may be classified among those of excellent indications, those remaining are "good," and reliance can be placed upon the general system to respond readily and favorably to treatment.

Bilio-nervous, Sanguo-nervous, lymphatico-nervous; as we advance in the enumeration of these several groups of dual temperaments we also descend in the scale of favorable indications. Individuals belonging to this class would possess nervous attributes tempered or augmented according to the modifying types present with them. A marked feature of the teeth of persons belonging to this group, is the sensitiveness of the dentine, especially in the sanguo-nervous. The indications in this third sub-division, considered from the dento-temperamental standpoint, are uncertain and treacherous, and too much reliance must not be placed upon a favorable termination of treatment.

The fourth and last sub-division of the binary temperaments are bilio-lymphatic, sanguo-lymphatic, nervo-lymphatic. It will be borne in mind that we are now studying temperaments in which the basal principle is *lymphatic*. That uncertain, inert temperament that seems to have no power within itself to resist the inroads of disease, or to recover its equilibrim when its enemy retires ; needing constant propping and building up. Contrary to what might reasonably be expected, the bilio-lymphatic is not found to be as favorable a combination as the sanguo-lymphatic. This latter is classed with the nervous combinations, while the former, with the nervo-lymphatic, are placed by Flagg in that class which *he* calls "perfectly diabolical."

Thus do we find in the various types of form and feature of our fellow beings, indications of vast signification to us in the study of that force in nature upon which all natural recuperative processes depend ; always bearing in mind the fact that, in the treatment of all pathological conditions, the remedies applied do not of themselves possess the power of reorganization or re-establishment of a normal physiological state of the system, but are only *agents* in our hands by which we *assist* hampered nature to readjust her impaired functional activity, and to rid herself of that which, for the time being perplexes her.

The modern dentist is considered a *specialist.* Whether we may properly lay claim to that title or not, it is not my desire nor my intention to assert ; but I think all will coincide with the assertion that we employ special methods and special specific remedies, possessing special therapentic properties and actions, adapted to the special conditions we are supposed to treat. This is but as it should be ; for the public are learning to expect *better results* than in years gone by, and, as time advances, we find ourselves gradually but surely loosing confidence in medicines, *per se*, and by a natural and almost unconscious selective process we are singling from among the many agents at our hand, those which are most specific in their action. With us, no reliance can be placed upon that system of practice which discharges a load of therapeutic grape shot at a patient, hoping by some chance that a stray bullet may hit the mark. On the contrary, *our* aim must be sure, and our knowledge of the *varying winds of temperament* and their indications of inate natural power of resistance or recuperation on the part of our patients, such as is born only of close study and good judgment.

It has been a desire to add to the helps we already possess, that has actuated me in bringing to your minds some of the characteristic peculiarities of the different temperaments, hoping by their study, to improve our marksmanship in the "rifle practice" to which our systems of treatment have, not inappropriately, been likened.

RAPID OPERATIONS.

BY ALBERT H. BROCKWAY, M. D. S., BROOKLYN, N. Y.

[Read before the Dental Society of the State of New York, May, 1886.]

When I was asked, a short time since, to furnish a brief paper for this meeting of our society and weakly consented to do so, I cast about for a topic on which I might possibly be able to write something or interest in the limited time at my command. At the risk of repeating some thoughts that I have expressed elsewhere, I decided to speak a few words on the subject of Rapid Operations.

I choose this topic for several reasons : First, because my name has been in some degree connected with the idea, through a paper which I read before the New York Odontological Society ten years ago, and the discussion which followed thereupon ; and secondly, because I feel the great importance, not only of helping each other by any experience that we have gained in lightening the arduous and exhaustive labors of our beneficial profession, but also in the giving to our patients the benefit of any improved or ameliorating methods that we have devised. Lighten our labors as we may, and molify our manipulations as we will, we shall still continue to know fatigue and to be familiar with suffering ; but, thanks to the spirit of improvement, not to the degree which obtained in the past ; while at the same time we shall have the satisfaction of knowing that our services are vastly more effective in the direction in which they are employed.

To the minds of many, the term "rapid operator," applied to a dentist, calls up a picture of one careless and slovenly in his methods and satisfied with meager results ; whose only thought is to get over as much ground as possible in the shortest time ; or, if he be, perchance, credited with a desire to do passably good work, one callous to the suffering he may inflict, rough and unsympathetic in his manner,—a terror to those who may fall into his hands.

Neither picture is necessarily correct. Celerity is not incompatible with either thoroughness or gentleness, and rapidity may accompany the highest skill.

Now, rapidity is a relative term ; what would be by one considered rapidity, might by another be called intolerable slowness. Men differ in gifts ; a Parmly Brown may, by his natural ability and dexterity in the use of gold, achieve results far easier and quicker than another working with the same appliances and equal earnestness, yet not so naturally endowed ; but the point which I wish to make, is my belief that the average dentist may so prepare himself beyond his present condition that he shall vastly increase his efficiency and usefulness. And this is largely a matter of *equipment* and *system*.

To such of us as have been long in practice, the changes that have taken place and the improvements which have been made within our day seem to have almost revolutionized the dental art. Nearly all the instruments in use when we began practice have been superceded by something more efficient—the turnkey by the forcep, the hand bur by the burring engine, the file by the corundum stone, the napkin by the rubber dam ; and yet, with all these conceded and manifest improvements, there are, I am inclined to think, many in our ranks who fail to get from them much of their most obvious advantage.

I may perhaps be permitted to speak personally and make mention of some of the adjuncts which I have found so serviceable in my own practice as conducive to rapid operations. And first in importance has been an *assistant* at the *chair*. When I have sometimes urged my fellow dentist to employ an assistant, as on occasion I never fail to do, I have often been met with the reply that they had no need of an assistant, inasmnch as they "filled by hand pressure," or "used an automatic mallet," or "preferred to do their own malleting,"—showing at once that they had but the faintest appreciation of what might be the service of one. Indeed, so little is the value and utility of one recognized in general, that it is not uncommon to see the approach to the operating chair on the side where an assistant would be engaged, blocked by an obtrusive stationary spittoon or some other cumbrous fixture, completely shutting off access thereto, and of course rendering the proper employment of one impossible. Now, were my use of an assistant confined even to simply malleting fillings, I should be unwilling to forego such help ; but this is the merest fraction of the service which one can render.

The work of the operative dentist is essentially one of minor details, many of which can well be delegated to another working in conjunction with him, thus saving to the principal much of his time and strength.

For several years I have had associated with me in this capacity, a young lady, and it is not too much to say that to her faithful, intelligent and skillful coöperation, I am more indebted than I can express. To her is entrusted all the care of the instruments and medicines which I need to use, handing them to me as required, and putting them orderly away when done with. She looks to it that whatever can be prepared in advance is gotten ready before hand,—pellets for drying cavities, wound broaches for swabbing out root canals, waxed ligatures for helping on with the rubber dam ; and at the close of the day's work, oils and makes ready the burring engine for the morrow. Standing at the opposite side of the chair she attends to the comfort of the patient in every way; assists in putting on the dam or in retaining the napkins when the dam is not used; holds back the patient's lips during the operation of polishing the teeth or treatment in the mouth, starts and stops the water motor which drives my burring engine, or changes the burs as is required. With the chip syringe she blows out the dust when cavities are being prepared dry, or keeps the bur or corundum stone wet with a jet of water if prepared otherwise.

In the adjustment of the separator she renders what would often be a difficult matter, easy and expeditious; she prepares ready to my hand all filling materials, and assists in packing them into the cavity; in short, in a hundred ways augments my capacity and contributes to the comfort of my patient.

Next in importance to an assistant in the way of equipment, I should regard the water motor or some like power for driving the burring engine. I assume that at this day the engine is used by nearly every one, notwithstanding the prediction of my honored friend Dr. Lord, made on the occasion when the paper which has been referred to was read, that "in ten years or less all the burring engines would be thrown aside or but little used." For the operator to spend any of his strength or sacrifice any of his steadiness in driving his own engine with his foot as is generally done, seems to me to be unwise and wasteful to the last degree, and it is to be regretted that some convenient moter generally adapted to the purpose has not been devised. For some years I delegated the driving of my own engine to an assistant, with manifest advantage; then I tried an electric motor, but finding this unreliable, I put in a Backus water motor. This has now been some six years in use and has proved entirely satisfactory, the increased efficiency of the engine as driven by it over any other way being very notable.

Did time permit, mention might be made of other labor-saving methods and appliances less important than those already referred to, but each in some degree contributing to the ease and celerity of operations. I must be content, too, with but a brief reference to *system* as an element in rapid operations.

When we consider the great number and variety of burrs, drills, polishers, and the like, which go to make up the equipment of the engine, to say nothing of the numerous chisels, excavators, pluggers and scalers in daily use, the necessity of far greater system in their arrangement than generally prevails will be at once apparent. A convenient and orderly disposal of them, whereby every instrument, however minute, may be at once picked out for use, will save in the aggregate an incredible amount of time and vexation.

I have thought that it might add interest to what I should say and serve to emphasize the ideas which I have tried to present, to give from my own experience some statistics in illustration: and I find by reference to my books of record, that from April 5th, last, to May 8th, inclusive, I have worked 28 days, averaging about six hours each, in which time I have served one hundred and five patients, of whom eighty-four were adults and twenty-one children. For these I have performed the following operations :

Teeth polished, - - - - - - -	47	cases
Riggs's disease treated, - - - - - - -	3	''
Nerve cases treated, 30, of which were		
Found dead and removed, - - - - -	19	''
Destroyed and removed, - - - - - - -	7	''
Removed alive, - - - - - - - -	4	''
Teeth extracted, permanent, - - - - -	13	''
Teeth extracted, temporary, - - - - -	23	''
Permanent teeth filled, - - - - -	229	''
Temporary teeth filled - - - -	14	''

[Most of the permanent teeth were sixth year molars, removed for "offensive partisanship" from the mouths of adolescent youths.]

Laying aside the quality of these operations of which it does not become me to speak, I submit that this represents a respectable amount of work done, and I am sure without the employment of the accessories mentioned, quite beyond my power to perform with equal ease and satisfaction in double the time. Let me, then, in closing, express the hope that what has been said may not be without stimulus and profit to some who have heard, and to ask if any one can, in this day of progress, afford to forego the advantages which I have endeavored to point out.

CARE OF THE TEETH AS A PREVENTIVE OF DECAY.

BY CHARLES S. BUTLER, D. D. S., BUFFALO, N. Y.

[Read before the Dental Society of the State of New York, May, 1886.]

In the subject I have chosen for this brief paper there is nothing new to present to you ; and it is only from a fear lest we shall at times forget its great importance to our patients that I seek to introduce it into the discussions of this meeting.

That our best time and thought should be given to the filling of cavities and the arresting of decay, is but natural from the very nature of our profession, yet much good may, I am sure, accrue both to our patients and ourselves by a little study now and then of the subject, "How best to prevent decay."

That very much can be done in this direction by a proper care of the teeth should be the controlling impulse with us all, so that we may impress it upon our patients both by theory and example in a way that they shall not forget it.

The care of the teeth is largely a matter of education, and unless we are full of the subject ourselves we shall be unable to instruct others. It is not enough that we should fill scraps and clean the teeth that come under our care. We have done but half our duty if we permit the case to pass out of our hands without the patient's feeling the great need of constant and earnest attention to them.

With the eruption of the first deciduous tooth should begin this matter of education to the child. The nurse or mother should regularly, once or twice a day at least, rub the tooth and gums with a soft linen cloth, wet in cold water. This will prove both soothing and refreshing to the child. As age advances and other teeth appear, powder, of a good quality, should be added to the cloth until such times as the brush can be substituted, which generally can be done at an early age, as excellent articles are in the market everywhere.

This rubbing and cleansing of the mouth will have a marked effect for good upon the condition of the teeth and also render their eruption easier and less likely to cause alimentary disturbances by that reflex nervous irritation, so hard to explain, yet so common at this period of child life. There are those I know who deny the theory that the process known as teething has to do with alimentary disturbance in any way, and I am not disposed to stop here to present arguments one way or the other, but will only say in passing that so far as I am able to discover, the weight of evidence seems to be upon the side of the question as above stated.

I trust, Mr. President, that as this is a very important matter to us all, it may be taken up in the discussions following this paper and expanded in the light of recent investigations.

After the brush the dental floss should be added, and if I were to mention these in the order in which I regard them, I should say the dental floss then the brush, though with the deciduous teeth the silk can not be used to so good advantage as with the permanent set.

Orange wood, with powdered pumace stone, tooth powder of a good quality, and in some cases, though rarely, a mouth wash should be added in due time and the child taught in their use and the great benefits to be derived from a thorough, business-like application of them. And what I am insisting upon for the deciduous teeth, I would also insist upon only with greater emphasis for the permanent ones. A thorough, vigorous cleaning, two or three times a day at the very least, and as much oftener as the child can be brought to attend to it, is what is needed. It is hard to overdo this matter, and the point I am urging is, the better care taken of the teeth the less decay there will be.

And is this the understanding and education our patients have of this subject? Do they feei on leaving our hands, having had their teeth filled and put in order, that the success of that work depends largely upon their own efforts? Do the mothers of the as yet unborn children understand how very much depends upon them as to the kind of teeth their offspring shall have? If not, is it not clearly their dentist's fault? For is it not, certainly, his special privilege to teach and educate them in all that pertains to their own and their children's teeth.

It is not enough that we deal with these organs simply as we see them in our offices? We should go back of and beyond this and study the various influences operating upon them long before their eruption. Climatic and dietary influences as well as the temperament, habits and surroundings of the maternal parent. And as this thought opens up a broad field, enough for an entire paper in itself, and as I have promised, and have every disposition to be, brief, will leave the matter with you, trusting that the hint given may be sufficient to call out those here so well qualified to speak to us upon the subject.

In concluding, let me say that it is my firm conviction that the quality of the teeth of the future depends largely upon the care given to those of the passing generations.

A CASE IN PRACTICE.

BY WM. H. ATKINSON, MD., D. D. S., NEW YORK,

[Remarks before the Dental Society of the State of New York, May, 1886.]

I gave to the Secretary the caption of a paper which I would present to the society at this meeting on "A case in practice," but I have to say that it is not yet completed. The case I refer to, presented in the month of February, is the wife of a physician and had been in the hands of many professional men, from San Francisco to Rome. It was a case of pyorrhea alveolaris of the left superior central and lateral incisors and the right superior second molar; the left superior central incisor projecting badly below the line where the tooth should be, and held simply with a ligamentous tissue. The loss of a lower molar had thrown the right superior first bicuspid out of occlusion, rendering proper mastication impossible. The right superior lateral incisor was in a like condition to the bicuspid just described, and I was in doubt whether the pulp were living or not, yet it proved to be alive, but in a dying condition from atrophy; still there was a little blood when I removed it.

The treatment of this case was standard treatment; which is marked by certain points that will hold good in every case, leaving enough scope to admit of variation according to circumstances. So far as standard treatment is concerned, it consists of putting the tooth in the position in which you intend it to be kept, tying with floss silk (here, it is understood as well, and perhaps better than it is by myself, what should be done so that the tooth can be held in position while tying). Many teeth must be tied firmly in order to clean them, especially where there are dense calcifications upon them. After they are securely tied, let the patient close the mouth to see where the points strike. Then proceed to cut them down with a corundum wheel in a rapidly moving engine until they strike where they ought, and in such a condition that each tooth shall do its part in the work of receiving the impact of the other teeth. Then proceed to remove the foreign matter from the points and spaces or interstices of the teeth.

It may seem very easy to say "That is just the way I do it," but I tell you, if you have any religion about the question of the teeth, you cannot say it is so easy. If you have not correct views, you had better renounce or throw up the case, rather than leave the source of mischief there.

Another step which was taken in this case, was, after washing out thoroughly the debris as far as I could, and drying it well, to take caustic paste, made by mixing or co-mingling caustic potash and crystallized carbolic acid, without water, and carry crumbs of that paste into the sac where pus had been discharging from the carious territory, where serum exudes to moisten and liquify the caustic paste so as to hold it by capillary attraction and place it where it was most needed. Unless you are in perfect rapport with your patient, it will be best to do but one jaw at a sitting. This lady believed in us and allowed us to work over her for five hours and we finished both jaws. To do this you must have a clear idea of what you are about, and I will state that you should be very careful not to have the caustic paste come in contact with any tissue except what you wish to destroy.

And what are the tissues you would wish to destroy? The dead or dying portions of the pulp or other tissues. If it touches the healthy gum or the connective tissue it makes an unnecessary wound to heal. You should not destroy the parts filled with arteries and sinuses that supply the blood. My very mesentery trembles when I think of what patients have been subjected to in these cases, and when I see the white lines showing the track of the instrument cutting away the blood sinuses and the white scar where the mutilated mucous tissue has left hard lumps, devoid of red blood circulation.

To instruct you how to avoid this mischief in having the caustic paste go where you don't want it to, one way is to keep folds of bibulous paper between your fingers and the gum and have your finger always so that you can control it; and another to have some good, strong vinegar at hand to place over the little mouths of the pockets where you put the caustic paste, acetic acid being the proper antidote for the carbolic acid in the paste.

Wash out with warm salt and water, and never put fresh water in the mouth or on a fresh wound or old wounds that you are dealing with, without putting in salt. Remember that particularly. If you want to injure your patient, you will use ordinary water—even distilled water is not fit for dressing the mouth with. You want to have it about as saline as sea water. Dry well and inject per-oxide of hydrogen; if you find any odor, then dry again and spray with a few drops of some cosmetic. I prefer $Hg\ Cl^2$, 1 to 500 of water, with a little spirits of lavender. This solution ensures the death of any microbes that may be present. After you have done this dry again and take from six to twelve folds of bibulous paper, smear a little tannin and glycerine on the side next the gum and lay it between the teeth, over the gums. Don't put a bushel, or ton or quart of glycerine on it but just enough to make it adhere nicely, and that will be all that is needed to make a protective layer for the coagulum. Where we desire to get renewal of only a part of a system, we have to induce the same steps as occur in the molecular changes in the original production of tissues ; the same that it would go through if produced in utero.

I have yet to find a case in this condition that had healthy blood—I never have known a patient where the pulps were in a healthy condition; in all the cases where I have found pus discharging I find a local depression ; in other words, as the old ladies say, "Their blood is out of order." Digestion has not been perfect, and correction of the digestive process may and will manufacture the elements that constitute the perfect peptone, and which is the material out of which are made the tissues and blood and nerves.

This is a description of the case as far as the pathological conditions are concerned. On the fourth day of the case an impression was taken and a plate made of platinum and iridium, with gold flowed over the surface of it, supplying the missing teeth. The next time the patient came there was a lower biscuspid on the right side which had to have a slight change to admit of resting against the upper biscuspid and second molar. I said the first molar and second biscuspid had been extracted and that left just enough room for a large biscuspid to be placed in there. The right superior lateral was extracted and as soon as the blood subsided a sponge graft and the plate were inserted. The lady went home and the next day but one came and reported she had eaten the first comfortable meal in five years.

My reason for not completing the case is, perhaps, a peculiar one. I wish to show the appearance of the reproduced gum. On the side towards the point where the lateral incisor was extracted, the sponge graft took admirably on the posterior face and nearly around to half the depth from behind, forward of the transverse process, except the lower part, directly on the lower antero-proximal face. A little pus discharged from that place. I treated it as I have suggested. The first treatment was to use per-oxide of hydrogen, which is a good washerwoman. This is a great disinfectant and microbe killer it is claimed, and they who think so will be greatly disappointed when they find out what it is. Its great business is to kick up a row and create bubbles by combining with some of the elements of the contents of the pocket. The treatment is to apply a little $Hg\,C^2$ solution to the sponge graft where these bubbles are present, and where a union has taken place, a little blood may issue.

I did not tell you how to put in the sponge graft, so I will state that. The way to prepare your sponge is to have it free from all foreign matter, as lime or silica, and be sure that you have a sponge that has not been bedevilled by anyone. Get your sponges from the wholesale dealers; you had better buy them by the pound than run the risk of having them meddled with. Clean them out and put in a vessel that will submerge the sponge; put distilled water into that and add one grain of bi-chloride of mercury to the ounce of water, and set it over a Bunsen burner and place a thermometer in it, and raise the heat to 130° Fahr., and keep the heat from 130° to 164° which will accomplish the work. If you get it as high as 150° five minutes will do the work. Then you may leave the sponge in the solution and keep it away from the air.

When you are about to place a graft, cut the sponge to form a piece shaped so it will fill the cavity, which will be filled with serum by capillary attraction. Place a protecting skin over the graft to retain the deposited serum. When the granulations come through the sponge, apply your finger with light pressure, and if it is well elaborated pabulum it will rope out as your finger is withdrawn, and if it ropes out thick and leaves globules on the string hanging from the finger you will have a fine protoplasm. Place a pack of bibulous paper upon the surface and touch it till it ceases to rope or until the rope breaks short, indicating a dense, well elaborated protoplasm. Then, with a gold probe (you should never use anything else in these cases) apply a saturated solution of salycilic acid in alcohol to the surface of the sponge, so it will cook the albumen until it looks like the coagulated white of an egg. This gives you your pabulum. Send your patient away and if you never see him again he is probably all right.

Another case I will relate, of a patient who had been in reputable hands. She had a central incisor, pulpless, that had been treated and filled. Pus formed on the left central and was treated and thought to be cured for a few months, but it broke and had continued to run for four years, and was seen by physicians and surgeons and dentists, and finally she was sent to me for advice. I examined the case and found that the filling had been done well and I could not satisfy myself that the discharge came from those two teeth, but a close examination proved that the pulp in the right lateral was dead and upon that supposition I pressed over the end of the root of the right inferior lateral, proving a connection between that and the fistule over the transverse process between the cuspid and bi-cuspid on the left side. With a piece of bibulous paper, wet with half creosote and half oil of cloves, inserted into the fistulous tract, the origin was revealed. There were caries and alveolar disease over the cuspid ; the alvelolar plate could be seen directly opposite the root of the right lateral, through the opening made at that point. On the second day there was an opening made through the root from its lingual face through the foramen into the seat of the mischief, and it was dressed with creosote and oil of cloves, which was pumped through until it escaped freely from the opening made at the end of the root. The root was then filled with a solution of gutta percha in chloroform. A sponge graft was put in so it would allow the gum to lap over it, and I never saw any discharge from that, and in four days it was well. No appearance of the cut· It did not show a scar, but was a simple reproduction.

The other side did not do so well with the sponge graft. The second day I clipped a bit off, and on the third day the granulations came through, and on the fourth day a little pus was discharging from the posterior extremity of the wound. On the fifth day it ceased and grew, and the only difference I could see on that side after eight days was a slightly increased thickening where it should have appeared normal.

The spray should be used daily, and if the case does not present daily, a spray apparatus should be given to be used by the patient for himself for any disease of the gums or any broken tissue in the mouth. They should use the bi-chloride solution at least three times a day.

These are typical cases, and cover the ground so that if you understand them they will enable you to be master of the situation, as we never have been.

There is only one other point that impresses me now, and that is, where the pyorrhea has existed for so long a time that so much tissue has been lost as not to hold the teeth firmly and let you operate. There is great difficulty in proceeding to get a reproduction from a sponge graft and bring forth new tissue upon a higher level than it was. We need not allow the root to be more exposed than it was, and in some cases the sponge graft must be placed very carefully. I have, perhaps, made elipses in the details which were sharp to my mind most of the time, and if I have, and you will ask the direct question, I will show you that I do know what I am talking about. If not, I will take my seat and hear from others.

PHOTO-MICROGRAPHIC WORK AND APPARATUS.

BY JOS. N. LEVI, ROCHESTER, N. Y.

[Read before the Section of Microscopy, R. A. S.]

Within the past several years the rapid increase in numbers of persons interested in microscopical investigations has created a desire on the part of many of them to be able to produce a faithful photographic representation of the object under observation and study. The reason for this is evident, since so few of us are gifted with the skill necessary to the production of a good drawing, which, while it may please the eye, falls short of the scientific value as a faithful impression made by the object itself. The study of diseases in which bacteria play so prominent a part, the identification of microscopic animals and plants, and the risk of breakage and other damage done to the slide and object from rough handling during transportation through the mails, make photo-micrography of special importance. Its value can not, therefore, be over estimated. Though by no means new, this branch of photography may be said to be still in its babyhood. Some of the best results that have ever, as yet, been obtained, are those by the late Colonel Woodward, of the Army Medical Museum, at Washington, whose photo-micrographs of the markings on the amphipleura pellucida and other diatoms have astonished our foreign neighbors as well as ourselves. These results have been accomplished by the aid of a dark room, especially fitted up for the purpose, and costly apparatus, at the expense of the government. This may all be well enough for professionals or persons who have the facilities and opportunity afforded them by government or educational institutions, but another class of investigators have come forward within the past few years, and though they may not have been rewarded by the discoveries of a Pasteur or a Koch, they have served, by their humble efforts as a medium, to spread broadcast the simple truths of science. What are they to do, then, who have not the above advantages? On the other hand, it is surprisingly wonderful how very inexpensive and easy it is to take a photo-micrograph, according to some of the present literature of the day! All one has to do is to follow the directions given and they are sure to produce good results! It may be well for me just here to state that what is given you in this paper are merely suggestions drawn from my own very limited experience; that the old time maxim of "try, try again" is the only teacher; and that should any of you who have not already done so, take up this interesting branch of photography, you will perhaps find that you can make many improvements which will be better adapted to your own mode of procedure.

CAMERAS OF WAMSLEY AND ATWOOD.

It having been assumed that you are the possessor of a microscope and such accessories as you may need in your investigation, which should include a bullseye condenser; and, if you intend to photograph with high powers, an achromatic condenser constructed on the Abbe principle should be included. Outside of this, your apparatus need not be of an extremely expensive character, the camera being the principal thing needed. Of the endless variety of forms, whichever kind you use it should be made of well seasoned wood so that it will not warp. The ground glass, or screen as it is sometimes called, must be of the finest, the bellows of the best material, and the plate holder must fit tightly and occupy the exact position as the screen when in place. The whole must be rigid, firm, and accurately made. I take pleasure in recommending, of my own accord, the photomicrographic camera made by Mr. Wamsley, of Philadelphia. It possesses all the qualities already mentioned, the body being square, the length about two feet when extended, permitting the use of a four and one-half by five and one-half plate, vertically or horizontally. The plate holder is also fitted with a kit for the use of a plate three and one-fourth by four and one-fourth. The focusing screen is hinged at the bottom, and is held in position by means of a spring catch, which also holds the plate holder in its place. I prefer that the screen be capable of being entirely removed when not in use. The bellows is in two sections, being divided in the middle by a square frame of wood, which prevents it from bending, necessarily so on account of its length. Attached to the front is a cone made of heavy pasteboard, into which the tube of the microscope is inserted, and rendered tight by winding black cloth and securing it with rubber bands around the cone and the end of the microscope, allowing enough play for the forward and backward sliding in focusing. The cone, including the front piece, is removable; the bellows slides upon a frame secured at any desired point by a thumbscrew, as in the one before you, or a cam operated by a lever convenient to the hand. In the newer kind, a scale divided into inches is attached to the frame, so that the length of the extension can be ascertained as an aid in finding the amount of amplification.

Another good camera, though in some ways deficient, is the one devised by Mr. H. F. Atwood, of this city. It consists of a square cone made of wood, and provided at one end with a nose-piece fitted with a society screw for the objective, and on the other, the screen and plate holder for a four and one-half by five plate. This rests upon a suitable platform, on which is also mounted a stage and sub-stage, somewhat the same as those attached to the Bausch & Lomb microscope, the makers of the camera in question. The stage and sub-stage are set into a grooved piece of brass work, attached to the platform near the nose-piece. The coarse adjustment is made by sliding the stage and fittings by hand in the grooved brass work on which it rests. On reaching an approximate focus, the stage is secured by a friction screw. The fine adjustment is controlled by a milled head placed directly under the ground glass focusing-plate, and acts by a lever on the nose-piece carrying the objective. Notwithstanding the advantages set forth by its inventor, I beg leave to apologize for any criticism that I may pass upon it, since I am under the impression that with some alteration it may be made the *ne plus ultra* of photo-micrographic cameras. The claim is a good one that the microscopist is not obliged to dismantle his microscope every time he wishes to photograph, and *per contra* is not obliged to upset his outfit to examine an object under his microscope. Both are at all times ready for their respective work, a decided advantage beyond doubt, and one which no one can dispute, since the time required to adjust the microscope to the camera and render it light-tight is both loss and annoyance and not at all necessary with the improvement which I shall take the liberty to suggest further on. Its disadvantages are very serious ; having no bellows, it does not permit one to increase or diminish the size of the image with the same objective. This can be done only by substituting an objective of a higher power, which means loss of time and light. I would suggest that the cone be shortened to about half its length, and a bellows which could be extended to from two to three feet from the object attached, substituting a four and one-half by five and one-half screen and plate holder. This would, of course, involve more expense, but it must be remembered the intended series of amplifiers which are being devised for increasing range of powers, would involve double the expense of the plain I have suggested if the amplifiers are to be of any value at all.

MOUNTING THE SAME.

The mode of mounting the camera and microscope together may be described as follows: Two boards of well seasoned wood four and one-half feet long by twelve inches wide and about one inch thick, are hinged together on the inner sides at one end. I give the size of mine, but it may be made any size that may be required. On the inner upper side in the middle opposite to the fastened end, is a small, long, narrow piece of board, attached also by a hinge, and which sets into a groove made to fit so that the two boards can be entirely closed, and acts as a support when they are open. At the same end on the upper side of the lower board, is a set of teeth, chiseled saw fashion, to act as a check for this support, and allows the upper board to be placed at any desired angle. Three other boards are required, one of which should be the size and width of the frame of the camera which rests upon it, the other two of the same width and about seven inches high. The latter two are hinged one to the former on the under side at the anterior end, the other at the posterior end, the whole being in the same manner attached to the large upper board, with the exception that the hinges are placed on the lower opposite sides. This enables one to lower or raise the camera toward the microscope by an angular motion, and can be secured at any desired height by the following arrangements: A stick of wood, sixteen and one-half inches long by one and one-half wide is hinged to the under side of the board on which the camera rests, and at the other end to a block of wood five inches long to one and one-half wide. This block fits into a long groove of its width and thickness in the large upper board, and a second groove of the same length made within the first, going through the board, and wide enough to admit a thumbscrew which passes through the block and is fastened with a nut on the under side. The block should slide smoothly and with ease along the groove, and can be secured at any place by simply turning the thumbscrew tightly. This arrangement allows the whole apparatus, microscope and camera, to be placed at any angle desired when the mirror alone is used, instead of a heliostat with daylight. All that remains is to have some manner of fastening the microscope to the board to prevent sliding off.

ILLUMINATION.

The illumination forms one of the most important factors of the whole operation. The kind of light is, of course, that which is the most actinic. Good daylight is therefore preferable, at the same time most expensive. It should be remembered that we amateurs are engaged in business or professional life, and that to a good christian like myself, the sabbath is out of the question : it generally is, with real, good, scientific christians. But, after all, the sabbath is only one day in the week, and in this respect is very much like sunday.

The next best are the electric, magnesium and calcium lights. These, as well as a heliostat, which is sometimes employed with daylight, knock the lining out of the pocket-book, which in nine cases out of ten, when too full, digests very slowly. The light of a good kerosene lamp must, in the absence of all these, be resorted to, and though deficient, comparatively, in actinic rays, it is only a matter of time in the exposure and the question of obtaining enough to see the image clearly to focus with. Enough can be got for the lower and medium powers without any difficulty whatever, and I do not think for the higher ones we need borrow trouble. Good photo-micrographs have been taken with a lamp by central light with objectives as high as a twelfth and sixteenth ; while in the January number for this year of the *Amer. Mon. Microscopical Journal*, an account is given of photographs taken of the lines on the amphipleura pellucida by lamplight reflected from the mirror. The splendid photo-micrographs of Mr. J. D. Cox, President of the American Society of Microscopists, as high as fifteen and sixteen hundred diameters, bear ample proof of what can be done with lamplight. It is best to begin with the lower powers, a two-inch, three-fourth and one-half-inch, and after you have been successful try an eighth and so on. Choose a lamp with a large single burner, and use it with the edge of the flame turned toward the condenser. The reflection of the light upon the inner surface of the tube of the microscope causes foggy negatives, and must be obviated before any work is done, by rolling a piece of dead black paper into tube form and inserting it into the microscope. While this is the easiest way it is not the best, not so good as velvet, as the many thousand straight, short fibers are better calculated to break up these rays. It should be fixed in this manner : Have a round piece of wood turned about one-eighth of an inch or a little less than the diameter of the tube of the microscope. On a piece of stiff writing paper glue so as not to blister, plush side out, some dead black velvet, not blue nor blue-black ; be very careful about that ; when dry, wrap the velvet on the inner side around the block and let it lap over about öne-sixteenth of an inch, placing thick rubber bands around it to keep it in place until fixed and dry; then glue several more thickness of paper around this or enough to make it fit nicely into the tube of the microscope; remove the wood and cut the tube the proper length. The fringe on the end of the velvet toward the screen prevents a clear and sharp outline on the edge of the field, but is overcome by having on the outside a brass ring, three-fourths of an inch long and one-eighth thick, which is cut away five-sixteenths of an inch half way up, so as to form a groove when placed in the end of the microscope, and into which the edge of the velvet tube fits.

When using the ocular, after the above precaution had been taken, I found that after all the result was a foggy negative every time, and for several weeks and after having used several dozen plates, I was about giving it up in despair, when it happened to occur to me as I was about to adjust the plate holder to the camera to make an exposure, that the brass work of the eye piece might be the cause. And so it was, as I afterward proved; the light coming through the eye piece to the plate was reflected back to the ocular and then back again to the plate. A round piece of black paper with a hole cut in it to fit over the eye lense, which was already black, and black cloth wrapped around that part of the microscope in the camera, and I was never afterwards troubled in that direction. Another thing to be attended to is equal distribution of the light on the field, a very difficult thing to do when the lamp above is used without the bulls-eye condenser, and requires a most trained and skillful eye. It is better, however, at all times to use the condenser. Move it forward and backward until it is a little to one side of the focus of the lamp flame, so that it will fully cover the aperture of the objective. You can do this easily by holding a piece of white paper in front of the objective, or better still in front of the diaphragm. I should mention as being very important, that the use of the diaphragm increases the sharpness of the image; use the smallest aperture you can provided the size of the object will stand it and you do not mind a little more time in the exposure. For objectives above two-thirds or one-half you can not secure enough light without the use of an acromatic sub-stage condenser, when you must also remove the eye piece, which acts greatly increases the light.

I would here say that in face of the fact that some of our best authorities disagree regarding the use of eye pieces, I must decline to give any decided opinion in the present state of my experience, except that I have always used them with the lower powers and found no difficulty, and which the photo-micrographs which I present for your inspection this evening will bear me witness. For the medium and higher powers the sub-stage condenser should be turned up to the object (most of them are furnished with diaphragms), and the bulls-eye condenser next to the lamp in front of the flame, so as to catch all the light possible coming from it, and both lamp and condenser moved backwards and forwards until the rays which proceed from them cover the aperture of the sub-stage condenser. In this way no light is lost. Keep the lamp filled, the wick trimmed, and never turn it up or down during exposure, which will not be necessary if you attend to the above directions. You will find with high powers the field will not be brilliantly lighted up, but enough can be obtained to see the object fairly and get a focus.

PREPARATION OF THE OBJECT.

And now we come to one of the most important and at the same time neglected by all persons generally interested in this branch of work. The object should be especially prepared for photography. Most specimens when viewed under the microscope will appear perfectly clear and make a good impression on the eye, but will make an imperfect one when exposed so as to affect the sensitive plate. You may make an exposure of two or three minutes, or what in your judgment may seem correct, and no amount of doctoring in the development will suffice to bring out the details in the darker shadows. You make another of the same object, and with the same light and objective, giving double the time with the same result. Again, you try giving still more time with no better success. Your contrasts are to great, and where the darker shadows are properly exposed the lighter will be greatly over-timed. The cause of this is somewhat different than in landscape or portrait photography. The section, if such it be, may not be properly stained, being very deeply colored in one part and lightly tinged in another, or on the other hand if it be double stained, one of the colors may not be capable of transmitting actinic light to the sensitive plate—red, yellow or green, for instance. If a sensitive plate be exposed to the action of the solar spectrum it is found that the red, yellow or orange rays have scarcely any action, and that that of the green is very weak. Blue produces greater effect ; indigo and violet the greatest.

The different colors of the spectrum are not distinctly separated but gradually merge one into the other. Strictly speaking, the greatest chemical action upon the bromide plate is in the blue portion, the most intense being between Fraunhofer's lines F and G, varying with the sensitiveness of the emulsion, extending to H in the ordinary plate sold by dealers, diminishing almost below F, and more gradually in the violet and ultra violet as far as N. The greatest sensitiveness is therefore not in the ultra violet, but in the blue and violet.*

In staining tissues for photo-micrography, the above must be borne in mind, and it should be observed that no one of our pigments is a pure (spectral) color. For example, indigo, which is quite a notable exception, contains considerable red, while Turkey-red contains blue. From this it must be evident that your staining fluid, especially if it be an intermediate color, should be those colors which are capable of transmitting actinic rays of light to the sensitive plate, and those which produce the most chemical effect, should predominate in its composition, such as blue and violet. Besides the above it must possess the following properties which I have taken from Mr. C. O. Whitman's excellent work on "The Methods of Research in Microscopical Anatomy and Embryology," somewhat modified, to make it appliable to photo-micrography:

1st. It should penetrate readily, so that its action on the deeper and more superficial parts may be as equable as possible.

2d. Its action at full strength should be intense—capable of imparting any desired depth of color.

3d. It should give a diffuse and even staining, marked by slight differentiations—that is, it should act with unequal degrees on the different elements of the cell, thus contributing to sharpness of definition; but the contrast should not be too great, and the section not stained deeper in any one part than in the other.

One more. It must be remembered the object of staining is to show certain details of formation of a histological or pathological value, not easily seen in the unstained specimen. Here is where the difficulty lies, that certain colors possess an affinity for certain tissues; especially is this true in vegetable histology, where the costlier dyes are used. Carmine is employed in staining the nucleus of cells, Beale's formula being used by some of our best workers, while other colors, many of them now actinic, are used for staining the cell wall and other transparent tissues. In such cases all that can be done is to tinge lightly with non-actinic colors and a little more deeper than usual with the others, (meaning if it be a double stain) so the contrast may not be too great. In the veins and arteries and other injections the same rule applies.

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* *American Monthly Microscopical Journal* for March, 1886. Photo-Micrography, by the Editor.

Hæmatoxylin seems to be the *ne-plus-ultra* of staining fluids, and is extensively employed in all lines of histological work by most of our advanced workers, and though all that can be desired when used under the microscope, it is somewhat discouraging in photo-micrography. A modification of this stain is given by Dr. Geo. A. Peirsol in the *American Monthly Microscopical Journal* for March, 1885, and seems to answer the purpose intended. I have used it with some success. Any good formula of the hæmatoxylin can be used. A thin section is selected and allowed to remain in the staining fluid until it is of an intense dark purple and is then placed in the following solution: Borax, 1 párt; potassium, 25; water, 100; and kept moving until the intense color is gradually discharged, and the purple tint is replaced by a bronze yellow, shading into saffron. Before reaching the latter color it should be washed in water, and is then ready for the further usual steps in mounting. The transparency of the object must be attended to by having the section cut as thin as possible, which is not difficult to do in these days of improved microtomes, and in which the skilled section cutter has the advantage. It must be evenly cut so that one part is not thicker than the other. If it be an insect and will permit without injury, spread it out. In all cases it must be mounted level on the slide. These precautions are absolutely necessary in order that the surface of the object may lay in the same place and insure the whole of the object being brought into a focus at the same time. It will do no harm to state that in the case of diatoms, desmids, filamentous algæ, blood, animal and vegetable fibres, some of the above care is not necessary. Be careful in mounting on the slide to prevent dust and all extraneous matter from getting into the preservative fluid, for it will be sure to make its appearance in the negative. See that the slide is dusted and well cleaned before adjusting it to the stage of the microscope.

TO FOCUS.

The most difficult thing to be accomplished is the focusing. The mechanical arrangements are exceedingly simple, if any be used at all. A groove cut into the milled head screw of the fine adjustment, around which is wound once or twice a waxed piece of strong spool silk, and passed down on each side towards the edge of the board and thence through a series of small screw-eyes to the end of the board. A small weight attached to the ends of the thread, just enough to keep it taut is be all that is required. A slow and steady pull on either of the thread ends will cause the milled-head screw to revolve to or from the object. This arrangement will be found more fully described in Prof. Sternberg's work on Photo-Micrographs, and while here described, as a necessary adjunct to this paper, I would say that I prefer that no mechanical arrangement be used at all. I have found that the constant pressure downward of the milled head, though *extremely slight*, will in due time render the fine adjustment entirely worthless for microscopic investigation. When high powers were used, at the slightest turn, the object would apparently float from the slide. My microscope, the fine adjustment of which was in an excellent condition, became entirely worthless, notwithstanding the extreme care I had taken. Not only did this occur once but each time after the adjustment had again been set in perfect condition by the makers of the instrument. With the use of the ocular, which I employ with low powers, the image covering nearly a 4x5 plate, the distance from the adjustment screw to the screen can be easily reached by the hand without any inconvenience. With the high power, in which case I remove the ocular as has been previously mentioned, to procure more light, the screen will be further removed from the object to obtain any amplification for the same size plate. This will require an arm's length to reach the adjustment screw, and which is, indeed, troublesome and tiresome, but I prefer a little inconvenience to that of having my adjustment ruined.

It will be not out of place here to say that to facilitate the correct centering of the object, draw two lines at right angles across the center of the screen with a lead pencil. Having your object adjusted to the stage of the microscope, your light properly arranged, the bellows closed, you turn the coarse adjustment of the microscope so as to bring the object in focus, and proceed to carefully centre it. After this, draw the bellows out to the amplification desired and again use the coarse adjustment until the object appears sharp to the eye. The ground glass of the screen being rough and uneven, one of plain glass must be substituted in its place, and the focus made upon the ærial image, to insure accuracy. To do this a focusing glass will be necessary. The best that I know of is to take one of the oculars with the eye lens removed, the field lens towards the eye and the open end flat upon the plain glass. Use the fine adjustment of the microscope for focusing upon the ærial image. The best way, without doubt, in my judgment, of focusing on the ærial image, is that adopted by Mr. Wamsley, of using a plate holder, made somewhat like the ones used with the wet plate process, the back being removed and a plain glass placed in the exact position that the plate will occupy when being exposed. All one has to do after the focus is made is to substitute a sensitive plate for that of the plain glass and make the exposure. Taking it for granted that the exposure has been correct and the plate properly developed, you will be surprised to see that the image on the negative is anything but sharp. This is due to the fact that no allowance has been made for what is known as "the difference between the visual and actinic face." In a previous part of this paper it has been said that it is the blue and violet rays of the solar spectrum that affect the sensitive plate, and while they produce the greated effect they are also the least visible to the eye, and are known as the chemical rays, while the red, orange, yellow and green appear the more visible and brightest and are called the optical rays. The different colors do not occupy the same amount of space in the spectrum owing to their unequal refrangibility, and consequently according to the laws of refraction, when light passes through a lens, the different colors in their dispersion will come to a focus at different points, causing what is known as chromatic aberration. Those colors composing the chemical rays will come to a focus at different points from those of the optical rays. This chromatic aberration is in a certain measure done away with by making the lens of the objective of glass of different refractive powers, one of which will counteract the other, so as to bring the colors together again to form white light. While in theory it can be done, mechanically, the curvature of the lenses can not be ground so as to bring the rays absolutely to a focus on the same plane. The lenses of the objective are therefore corrected for those colors which are best suited to the eye, the optical rays. The slight difference of those colors which, on account of not being able to bring them all to an absolute focus at one point, and are not corrected, is said to form a "secondary spectrum."

It will therefore be evident to you that objectives corrected for the optical rays and not for the chemical rays are not best adapted for photo-micrography. Microscope objectives are not corrected for chemical rays unless ordered so. Now, then, the reason why the image on the negative was not sharp and distinct was because you made no allowance between the optical rays and the chemical rays. The exact difference, can only be ascertained by experiment, and when once found is always the same for the same objective. In trying to find the difference, do not go about in a hap-hazard way, but have some system about it. Do it in this way: After having focussed on the ærial image, expose and develop your plate. Before exposing another plate, focus until the image appears about as indistinct as the one on the negative developed, noting the difference on the graduation on your fine adjustment between the focus on the ærial image and the one on the indistinct negative. Expose and develop the second plate, and if it is not sharp try again. You must try it on the ærial image, both toward and from the objective, and after a few trials will no doubt succeed. It was my intention to include the development, printing and toning, but the paper is perhaps already too long for one evening.

In conclusion I would say that on all and the many conditions mentioned herein depends success or failure, and what may at first seem to you a mere trifle will very often produce disastrous results. You will oft-times feel like throwing your whole apparatus out of the window and be tempted to give it up in despair. At such times it is best to stop work at once and try again another time. After a few efforts you will succeed, which I am sure will prove to you a great satisfaction.

HYGIENIC INFLUENCE OF SLEEP!

BY ELTON R. SMILIE, M. D , SAN FRANCISCO, CAL.

Probably there has been less attention paid to the symtomatic indications resulting from the physiological and pathological influences of sleep upon the recuperative energies of the human system than upon any of the processes essential to the vital resources.

The alarming increase of insomnia and its pathological indications of cause have at length aroused more general interest and investigations for testing the reciprocating sources that aid, in conjunctive action, to produce favorable or unfavorable tendencies for the induction of health sustaining sleep. The action of food on the stomach gives direct demonstration of local effects to distinguish the most suitable methods of preparing food for assimilable adaption in correspondence with the functions of nature, without proving a source of irritation. The interruptions of sleep may and probably do arise in the first instance from local irritations produced by indigestible food, as the thoughtful can easily detect in the action, the influence of cause and effect, whether for good or evil, and the irritation is sufficient of itself to arouse attention and suggest to the intelligent adult the required means of relief and future protection from a like recurrence.

It is only by persistent transgression that the morbid disruption of functional integrity is made in effect permanent by organic lesions of the nervous system. But there are often habits and customs engendered by innovations that directly prejudice and interrupt the somnolent physiological recuperative powers so that they cannot respond to the required benefits that nature infuses as compensative for the animal exhaustion of the insensible qualities derived from the nutrient source of sleep. The nature of the somnolent inspiration that revives the energies and rehabilitates the physical organization for a renewed repetition of its labors has generally been supposed to reside—without any definite idea of the modus operandi—in the functional rest obtained from the recumbent positions assumed, and muscular relaxation from the tension of exertion in combination with acting associate tissues and viscera. But if we closely examine the sleeping effects produced under the interrupted action induced by the inceptive excitement of fever, which is the secondary pathological condition evolved from physiological deviations, we cannot fail to discover in the transition the morbid reaction of an element that has hitherto passed as a natural sequence that would prove void of useful results on investigation or from the belief that it was a premonitory effect symtomatic of disease.

Whereas, in the first instance, it simply indicated a source of irritation that interrupted the equalized flow of the somnific agent from the reflex action attracted by quietude in periodic sway between night and day. If experimental attention is farther directed to the adjuvantic aids that induce sleep, they will open to view an unexplored vista into a nocturnal realm whose limits are not altogether circumscribed by the boundaries of light. There will also be attached to the investigation a more hopeful range of thought for penetrating and dispelling the mysteries that have yetafore involved in doubt a clear explication of the whys and wherefores that impress us with the conviction of an eternal existence endowed with an individuality of spiritual consciousness.

That we live, move, and have our being,
Is confirmed by the sense of seeing ;
This impression is retained in sleep,
When in dreams we nightly vigils keep ;
But intangible, the spirits trace,
In misty investment some loved face.
This bond memory tenacious holds ;
And, if well kept, peace and joy unfolds ;
But, if insomnia enters there.
Wakeful visions haunt with fell despair.

ALL PORCELAIN CROWNS AND BRIDGE WORK.

BY E. PARMLY BROWN, D. D. S., FLUSHING, N. Y.

[Read before the Dental Society of the State of New York, May, 1886.]

The era or removable artificial dentures is soon to pass away—excepting in rare instances, and for the very poor. The development of tooth filling to a state of great perfection is nipping caries in the bud. Badly decayed teeth are being crowned with porcelain and gold crowns, preserving them better at that advanced stage of injury than the former practice of filling, not speaking of the greater art in the practice where porcelain crowns are used, and the saving of nerve force and time to both patient and operator.

The total loss of from one to ten teeth on a single jaw is being remedied by permanent fixtures that, I am anxious to be put on record as saying, are in five important respects better than the removable dentures of metals and plastics that are commonly used for the purpose :

Higher art can be attained—greater strength.

As perfect cleanliness as the natural teeth at their best.

A more normal condition of the tissues of the mouth than with plates that cover the mucous surfaces.

Far greater comfort to the wearer, with an ability to masticate the food only excelled by the natural teeth themselves in a good condition ; the taste not being interfered with by the roof of the mouth being wholly or partly covered as with upper removable dentures ; the remaining teeth not being injured one quarter as much with the permanent fixtures as with removable plates.

And last, the great satisfaction the patient expresses in not having a moveable artificial plate in the mouth.

These are strong assertions some of you will say, but they are more than assertions. They have been demonstrated to my entire satisfaction by several years practice, and I am ready and anxious to demonstrate them to you, and prove each and every one of the claims I make as you may demand.

The all porcelain crowns and bridge work invented and practiced by me is the kind of work I refer to, and the only kind that will bear me out in the assertions of greater truth to nature, greater cleanliness and greater strength.*

Let the better element in the profession hail with delight any changes that lift us out of the slaughter-house, tooth-pulling era of the nitrous oxide gas introduction.

Let them hail with delight any changes that lift us above the mule-driving, hod-carrying ability necessary to construct the five dollar rubber set of gum sections, that usually looks like a white picket fence around a cemetery plot.

THE RESISTANCE OF TEETH TO POST-MORTEM DECAY.

BY GEO. H. HARRIS, ROCHESTER, N. Y.

In an experience of several years as the executive officer of a cemetery, during which term many removals of bodies were made where little more than bones remained, I was strongly impressed with the fact that teeth resist the encroachments of natural decay much longer than any other portion of the human anatomy. During an extended period of archœological investigations this fact has been repeatedly confirmed by attentive observation of the remains of both men and animals. In my cemetery experience, where the cause of death could be learned from records, it has been satisfactorily demonstrated that the bones of a person who expires in health, usually remain white and firm ; but the body of one dying from long disease yields quickly to the processes of nature—the bones become black and rotten and soon waste away. In several cases on attempting to remove bodies that had been interred from twenty-five to thirty years, only a few teeth and bits of skull could be found. The skeleton of a body enclosed in a coffin is not so enduring as one buried directly in soil. When remains are shut in a tight box the decay of the soft tissues affects the bones to a greater or less degree; but where a body is placed in contact with the earth, especially if it be a sand or gravel surrounding, the natural drainage of the ground dissolves and absorbs all matter from the bones, leaving them clean and, if the conditions are right, liable to preservation for an indefinite period.

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* Specimens were exhibited and described.

At Peterboro, Ontario, in 1874, the skeleton of an Indian was uncovered while removing a large stump, the main root of which had extended downward through the pelvis, a plain evidence that the interment ante-dated the tree which was some two hundred and fifty years old. Later I learned that the tree had been cut about fifty years, and thus calculated the probable age of the grave at three hundred years. Within a few hours after the skeleton was uncovered it crumbled to dust. The skull was secured entire, but it soon fell to pieces leaving a very handsome set of teeth which I retained several years. One tooth now in my possession is still sound and perfect, in marked contrast to the condition of very many teeth subject to atmospheric influences after long burial.

While bones remain in the ground the dampness of the earth acts as a preservative, keeping them firm if not entirely sound; but upon exhumation the effect of light and air as disintegrating agents is apparent and, as a rule, the bones soon decompose. On the former sites of Indian camps and villages in Western New York, quantities of bones are frequently found broken into mere fragments. From occasional upturnings by plows and consequent exposure they have become soft and can easily be crushed to powder; but teeth prove an exception and are sometimes discovered among the softer bones as sound and good as ever. The teeth of aborigines occasionally present interesting peculiarities. At Totiacton,—now the farm of J. F. Sheldon, in Mendon—destroyed by the French two hundred years ago, I picked up three incisors that had every appearance of having been artificially sharpened to a cutting edge, somewhat suggestive reminders of the old mariners stories concerning cannibals who filed their teeth to more easily feast on human flesh. On these grounds I also found two teeth partly incinerated, doubtless the sole mortal remant of some wretched victim who suffered fire torture at the stake. In 1881 the very perfect skeleton of a warrior was dug up on the Callister farm in Irondequoit about one mile north of the ridge. The jaws were large and contained a full compliment of teeth which had been worn off as even with the gums as though they had been cut and smoothed with tools of steel. A pair of jaws now in my possession, taken from a native grave at Stone Church, also present the same peculiarity ; the absence of a molar, the cavity having healed, indicating the possibility of a knowledge of tooth extraction among the aborigines. I have a piece of jaw bone, black and soft, with one bicuspid and two molar teeth, the only remains found in an Indian grave opened on the farm of Samuel Truesdale in Greece, in 1880. The enamel of the teeth is hard and bright and the roots sound though discolored ; while the teeth of a jaw taken from the Brewer mound in North Rochester and one from Genesee county about the same date, have cracked and fallen to pieces at a rate that threatens their early and total destruction. In each case there are good grounds for belief that the teeth are several hundred years old.

Regarding the comparative duration of the teeth of men and animals I have little data to establish a standard ; but it would seem that the preservation of bones and teeth for long periods is mainly the result of special conditions involving exclusion of air and a uniform supply of moisture. While excavating for aboriginal relics on the farm of Geo. H. Lee, in Greece, several years ago I found the molar and incisor of some animal imbeded in clay about two feet from the surface. At a depth of four feet I discovered a single bicuspid, well worn down, and bits of a human skull with a few fragments of bone. These remains were all in a bed of compact clay. The ground is supposed to have been occupied about four hundred years ago, and the teeth are doubtless near that age ; yet they are all bright and sound with one exception. In the examination of an ancient mound in the town of Lima, I discovered a fragment of jaw with a few teeth, one of which had evidently been knocked out by a violent blow, a piece of jaw-bone being still wedged between the roots. With these relics of humanity were several bear's teeth that had been perforated to serve as a necklace. All the teeth were equally well preserved, though those of the animal exhibited marks of long use as barbaric ornaments.

Some marvelous fictions regarding the former existence of races of gigantic men originated in the finding of enormous teeth which early anatomists were unable to classify. In the absence of knowledge, conjecture made special creations of men and beasts, using the great teeth as material evidence. Thus, early in the 17th century, Mazuyer, a surgeon, exhibited to the people of France and Germany several teeth "like unto an ox's hoof in size," and certain large bones, unearthed in Dauphiny, which he assumed to be the skeleton of a man twenty-five feet in height. Very learned men accepted his statement as fact, while King Louis viewed the mammoth frame and applauded Mazuyer's knowledge and skill as an anatomist. I believe there is some mention of one Habricot, who actually declared that the bones were those of an elephant, but his ideas were too advanced for the age.

When the agent of Lord Cornbury discovered the great molar under the high bank at Klaverack, in 1705, the combined wisdom of eminent scientific men of that day was insufficient to explain the mystery of its origin; and good Cotton Mather unhesitatingly declared it to be "the tooth of a man." Governor Dudley, of Massachusetts, wrote Dr. Mather that he was "perfectly of the opinion that the tooth will agree only to a human body for whom the flood only could prepare a funeral." Thus the wiseacres created an antediluvian man of fearful and wonderful proportions with only a single tooth whereon to base their theory; and modern scientists follow the shining example, founding their theorems on the broad and comprehensive principle elaborated by Cuvier. Subsequent finds of fossil teeth in various parts of America caused much speculation, and it was only when Baron de Longueil carried three similar teeth to France for critical inspection by D'Aubenton and Buffon, that the ante-diluvian giant theory was exploded, and the teeth properly classified as belonging to a species of elephant, which Cuvier named Mastodon from its peculiar nipple-shaped teeth.

The Mastodon became extinct in this country at a period variously estimated from one thousand to ten thousand years ago. Although remains of the huge animals are occasionly discovered in a disorganized condition, I believe no complete skeleton has yet been found. The most perfect parts are usually teeth, and there are many instances on record where these were quite perfect, while nearly every other part of the massive osseous structure was missing. Such was the case at Hinsdale, Jamestown, Jamaca, Stafford, West Barre, Albion, Perrinton and other places in this state, and at numerous localities elsewhere. Again, single teeth, supposed to have been shed while the Mastodons were roaming about the country, are occasionally discovered near the surface of the ground, some in a fair state of preservation. Various writers have figured nearly forty species of Mastodon from the different forms of teeth alone—the *M. obscurus* being named from a single tooth found in Maryland.

Except where otherwise noted, the several places mentioned in the above article are in Western New York, and not very far from Rochester.

ON THE USE OF THE MICROSCOPE IN DETERMINING THE SANITARY VALUE OF POTABLE WATER,

With Special Reference to the Biology of the Water of Hemlock Lake.

BY GEO. W. RAFTER, M. AM. SOC. C. E.

[Read Before the Section of Microscopy, Rochester Academy of Science.]

An abundant supply of pure water has always been considered an important desideratum of civilized communities. So thoroughly was this want felt and recognized by the ancient civilizations, that in order to afford such a supply conduits of the most expensive character were constructed. At Rome alone a daily supply of over 300,000,000 gallons was furnished. To bring this large quantity several aqueducts were required, some of them exceeding fifty miles in length.

In modern times this want is equally recognized, and usually our municipal expenditures for water supply are on a liberal scale. Indeed, excepting a few towns fortunately situated with reference to an abundant supply, the expenditure for this purpose is the most important item going to make up the sum total of municipal expenditures.

The financial value of water supply is therefore a matter of considerable importance, and methods of determining its sanitary value of necessity rank high in the economics of modern life.

It is the purpose of this paper to give a brief account of some of the methods in use for determining the sanitary value of a potable water.

By sanitary value is meant, in general terms, the purity of the water, its fitness for domestic use, etc., and the use of the term sanitary value may be understood by considering that such value is inversely as the amount of impurity; pure waters having high sanitary value, impure waters low sanitary value.

By pure water, is meant, again, water which is unobjectionable, from a sanitary point of view, for absolutely pure water, *i. e.*, chemically pure water; does not exist in nature. Earth and air both contribute organic and inorganic impurities, and the sanitary examination of a sample of water will in effect consist in determining whether or not such impurities are hurtful to those consuming it.

Let us first consider, briefly, the methods by chemical analysis. *According to Frankland, "The *exhaustive* chemical examination of a sample of water is one of the most tedious and troublesome operations known to chemists. It requires weeks, sometimes even months for its completion. This arises partly from the great multiplicity of separate substances which may be present in the water, both in solution and in suspension, partly from the very minute proportion in which those substances sometimes exist, and partly on account of the difficulties attending their exact determination. Such an exhaustive examination includes:

1. The extraction and separate volumetric measurement of the dissolved gases.

2. The separate determination of the weight of each constituent of the saline matters in solution.

3. The determination of the two chief elements of the organic matters in solution.

4. The separation of the suspended matters, if any, and the determination of their total weight when dry.

5. The separation and determination of each mineral constituent of the suspended matters.

6. The separation and determination as far as possible of each organic constituent of the suspended matters."

In sanitary examinations, however, the question is not what are *all* the constituents, and what their proportional weight, but rather, what, if any, are the unsanitary constituents and what are their amounts, and finally, what effect will they have upon human beings who use the given sample for domestic purposes?

Putting the question in this form immediately limits the range of an ordinary sanitary analysis very considerably. We know for instance that the volumetric determination of the dissolved gases will throw little or no light on the sanitary value of potable water. We know also that the separate determination of most of the saline matters in solution is rarely required as with few exceptions they have no appreciable influence upon the wholesomeness of a water. On no account, however, should certain of them be omitted. These are ammonia, nitrates, nitrites and chlorides. The mineral constituents should also be examined and if lead, copper, arsenic and barium exist in more than mere traces their respective quantities should be determined by weight. Finally the degree of hardness should always be determined.[*]

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*Water analysis for Sanitary Purposes, with hints for the Interpretation of Results, by E. Frankland, Ph. D., D. C. L., F. R. S., pages 9 and 10.

[†]The methods of determining the organic matter have been the subject of considerable discussion among chemists and widely varying opinions have been advanced on both sides of the question. On one side we find Dr. Frankland who aims at the quantitative determination of the *whole* of the organic carbon and nitrogen present, although confessedly, these, or an unknown proportion of them, may occur in harmless states of combination. On the other side we find the equally eminent Wanklyn attempting to determine such portions of one or both of these elements as most readily undergo change, as for instance the oxidation of carbon, or the formation of ammonia from nitrogen, the supposition being that such forms of organic matter as alter readily under the conditions of experiment are most likely to be the forms chiefly concerned in putrefactive decay, and likely in consequence to involve danger to health. Neither of these suppositions have yet been satisfactorily proved, although an elaborate, and in many respects admirable, system of chemical analysis has been built upon them. Dr. Frankland who has, as analyst for the Rivers Pollution Commission, had an opportunity to give this whole subject a very thorough study, has in conjunction with Prof. Armstrong devised the system of analysis which bears his name, and which is also known as the "combustion" process. This method is by far the most elaborate of any that has been proposed and aims as above stated at a determination of all the organic elements. This is accomplished by evaporating a given quantity of the water and in submitting the residue to a process of organic analysis.

The method devised by Wanklyn in conjunction with Profs. Chapman and Smith is known as the "albuminoid ammonia" process and while containing many points of interest must be considered as having on the whole relative value only. In the introduction to their work on water analysis its authors say :—[*]" It is a received fact that the drinking of water which contains an undue proportion of organic filth is injurious to health. Such being the case, the first question which the sanitarian asks respecting a given specimen of water which is proposed for use as "potable" water is this :—Is it abnormally charged with organic filth? To this question the water analyst is enabled by the ammonia process to answer in many cases by an absolute No. In other cases he can show that the water *is* abnormally filthy ; and in some cases that there is danger of specific poison."

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[*] See Frankland as above, pages 10-12.

[†] See Reports (1), (2), (3) on Results of an Investigation Made by Direction of the National Board of Health, as to the Chemical Methods in use for the Determination of Organic Matter in Potable Water, by Prof. J. W. Mallet, F. R. S., University of Virginia.

[*] Water Analysis; a Practical Treatise on the Examination of Potable Water, by J. Alfred Wanklyn and Ernest T. Chapman.

These two systems of analysis substantially cover all that has yet been devised in this direction of value. There are other systems among which may be mentioned the permagnanate of potash method, and the method by ignition, which while of value in certain directions lack generally the exactness of the first two and need not be specially considered here.

The following will serve to illustrate the value of results and the method of interpreting them for the Wanklyn and Frankland systems respectively:

*"If a water yield no "albuminoid ammonia" it may be passed as organically pure, despite of much free ammonia and chlorides ; a water giving less than 0.005 part of "albuminoid ammonia" in 100.000 parts may be regarded as very pure. A water containing 0.005 part of "albuminoid ammonia" together with a considerable quantity of free ammonia is suspicious, but in the absence of free ammonia the "albuminoid ammonia" may be allowed to amount to something like 0.010 part; above 0.010 part should be regarded as very suspicious, and according to Wanklyn over 0.015 part should condemn the water.

The Rivers Pollution Commission in interpreting the results of Frankland's process, make the following classification: *"Surface water or river water which contains in 100.000 parts more than 0.2 part of organic carbon or 0.03 part of organic carbon or 0.03 part of organic nitrogen is not desirable for domestic supply and ought, whenever practicable, to be rejected. Spring and deep well water ought not to contain in 100.000 parts more than 0.1 part of organic carbon or 0.03 part of organic nitrogen."

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*Wanklyn, Water Analysis as above, page 67. See also Water Supply Considered Mainly from a Chemical and Sanitary Standpoint, by Wm. Ripley Nichols, Professor at the Massachusetts Institute of Technology.

*Frankland, Water Analysis as above, page 143. See also Nichols' Water Supply, Chemical and Sanitary.

Prof. Mallet, of the University of Virginia, has recently made for the National Board of Health an exhaustive comparison of these various methods of water analysis together with a determination of their relative value. This report appears in full in the National Board of Health report for 1882 and is on the whole the best recent study of this subject.

In this report may be found a very full account of the different methods of water analysis together with the detail of each.

The report is too elaborate to go into at length here. The conclusions as given by Prof. Mallet are of great interest, as throwing light on the unsatisfactory results attending the examination of a sample of water by chemical means alone. His conclusions are as follows:

*" 1. It is not possible to decide absolutely upon the wholesomeness or unwholesomeness of a drinking water by the mere use of any of the processes examined for the estimation of organic matter, or its constituents.

2. I would even go further and say that in judging the sanitary character of a water, not only must such processes be used in connection with the investigation of other evidence of a more general sort, as to the source and history of the water, but should even be deemed of secondary importance in weighing the reasons for accepting or rejecting a water not manifestly unfit for drinking on other grounds.

3. There are no sound grounds on which to establish such general 'standards of purity' as have been proposed, looking to exact amounts of organic carbon or nitrogen, "albuminoid ammonia," oxygen of permanganate consumed, etc., as permissible or not. Distinctions drawn by the application of such standards are arbitrary and may be misleading.

4. Two entirely legitimate directions seem to be open for the useful examination by chemical means of the organic constituents of drinking water, namely, first, the detection of *very gross* pollution, such as the contamination of the water of a well by accidental bursting or crushing of soil pipes, extensive leakage of drains, etc.; and secondly, the periodical examination of a water supply, as of a great city, in order that, the normal or usual character of the water having been previously ascertained, any suspicious changes which from time to time may occur shall be promptly detected and their cause investigated.

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*Report of National Board of Health for 1882.

5. In connection with this latter application of water analysis, there seems to be no objection to the establishment of *local* 'standards of purity' for drinking water, based on sufficiently thorough examination of the water supply in its usual condition."

We may derive from the above the general conclusion, then, that chemical analysis alone, cannot in the present state of chemical science give full information as to the sanitary value of a potable water, and we are ready, therefore, to determine in what degree the microscope can be relied upon in obtaining such information.

The present writer is of the opinion that *ultimately* the decision of questions relating to the sanitary value of potable water may nearly all be determined by methods essentially biological in their character.

The examination of the organisms in the water itself will cover an extensive field and will afford ample opportunity for testing all the resources of our microscopes. *If either animal or vegetable life be found we have at once evidence of organic impurity, and the kind of animal or plant life discovered will give a clue to the class of water under examination. We know for instance that certain forms both plant and animal are only found in dead and decaying organic infusions, while other forms are equally the accompaniment of fresh and wholesome waters. The microscope, therefore, enables us to state not only whether the suspended matter is animal or vegetable but also whether or not it is dangerous.

The substances found are of the most diverse character, and may include in water containing sewage contamination minute portions of almost every article entering into the domestic economy of human beings. Such for instance as cotton, woolen and linen fibers, fragments of paper, muscular tissue, portions of epithelia from man, hairs of animals, starch grains and many others. A water containing these necessary concomitants of human existence is at once open to grave suspicion and should, unless accidental or temporary contamination can be shown, be in all cases rejected.

A complete description of the animal life which may be observed in potable water would require volumes, and our space will permit of mere mention of a few found in contaminated and impure water.

Among rhizopods we may mention the Amœbae which is considered to indicate impure water chiefly from the fact that its favorite habitat is found in bogs and morasses.*

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*See paper on The Sanitary Examination of Drinking Water by Dr. Albert J. Wolff, in the Eighth Annual Report of the Connecticut State Board of Health.

*Dr. Wolff.

Of infusoria the paramæcia are usually found in water contaminated with sewage and their presence may be safely taken as indicating either the presence of sewage or other objectionable organic matter in large quantities. The Paramæcium aurelia is frequently met with and should be studied until easily recognized by every microscopist interested in the biological examination of potable water. Indeed the whole family of paramæcia should be familiar to one engaged in this line of investigation. The writer has recently seen paramæcia present in large numbers in water which had no suspicion of sewage contamination. While several different species of paramecia were present there was no trace of the Paramæcium aurelia. In other cases of water free from suspicion of sewage contamination he has found the Paramæcium aurelia present. All such waters have contained, however, large quantities of decaying vegetable matter, and as an index of serious organic impurity the paramæcia may stand as the representative infusoria.

*Other infusoria are frequently met with as, for instance, euglena, especially the species E. viridis and E. pyrum. Also the kolpoda, coleps, stentor, kerona and others are found. The presence of these bodies indicates that their food exists in the water and that this must be either animal or vegetable. As yet, however, the most of these animals have not been studied sufficiently to enable it to be stated what the food of each species is. The settling of this question may possibly throw some light on certain obscure changes in the quality of water noted at various places.

Certain species of the entomostraca are frequently present in large quantities. The most commoh are Daphnia pulex and the Cyclops tenuicornis. In our own water supply there have been during the early part of the present spring a considerable number of the Diaptomus castor. In addition to the Diaptomus there have also been observed the Bosmina, Chydorus, Cypris and Canthocamptus. Entomostraca are of great interest as they are quite highly organized animals, and their study becomes quite fascinating from that fact. They have recently been considered as having possibly important relations to certain diseases,* the discovery having been made that Cyclops tenuicornis is infested with an *endo-parasite* which after passing through two moults in the abdominal cavity of the parent entomostracan is transferred to the intestinal canal of food fishes. This much is positively known. The inference may be drawn that these parasites pass either through the water or from the fish used as food into the human system and there cause if not actual disease at least serious disturbance. Two such parasites of the Cyclops are known, namely, the *Cucullanus elegans* and the *Fillaria medinensis.*† The Daphnia schæfferi has also been observed to have nematoid worms parasitic in the blood sinus in front of the heart, subsisting upon the nutriment in the blood which constantly bathes the animal.* It seems to be a fair inference, then, that the pathological conditions prevailing among the microscopic animals infesting our water supply are of importance and well worthy of careful study and investigation. This is brought home to us even more forcibly when we consider that probably many of these endo-parasites are but the immature forms of parasites of animals much higher in the scale.†

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*Parke's Practical Hygienne, 6th Edition, Chapter on Physical Examination of Drinking Water.

This branch of our subject is as yet hardly touched and the present writer predicts rich returns to whoever will give it patient cultivation.

The question presents itself: Of what use after all are these various little animals in the final economy of nature? Dr. Baird in the introduction to his "British Entomostraca" has answered this question so far as the entomostraca are concerned substantially as follows:

Referring to Cypris he says:

"The greater number of these little creatures are furnished with branchiae, either to their feet or maxillae, and when noticed in their native habitats may be seen to have them in constant motion, their action being seldom interrupted. One chief use, therefore, of them in the economy of nature may be, as Muller says, to ventilate the water day and night, and as they chiefly reside in standing pools, they may thus be of great use in preventing them from becoming putrid. And again, I have no doubt that most of the entomostraca are essentially carnivorous, and I have frequently seen specimens of Cypris in their turn, as soon as dead, attacked immediately by quantities of Cyclops, who, in a few minutes, had fastened themselves upon the dead animal and were so intent upon their prey that they were scarcely frightened away from it by being touched with a brush In a short time the Cypris might be seen lying at the bottom of the vessel, the valves of the shell separated and emptied of their contents. When, indeed, we consider the amazing quantity of animals which swarm in our ponds and ditches, and the deterioration of the surrounding atmosphere which might ensue from the putrefaction of their dead bodies, we see a decided fitness in these entomostraca being carnivorous, thus helping to prevent the noxious effects of putrid air which might otherwise ensue; whilst they, in their turn, become a prey to other animals, which no doubt serve their purposes also in the economy of nature."

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* See A Final Report on the Crustacea of Minnesota, by C. L. Herrick.

† See Report as above by C. L. Herrick.

*The most of the rotifera are not considered to be generally harmful. The common Rotifer or Rotifer vulgaris may, however, be taken as an index of organic impurity, being usually found, in the present writer's experience, accompanying decaying vegetable matter. A few others are also found in impure waters.

*Concluding the subject of animal organic contamination the question may be asked, are there any cases in which the origin of epidemics or diseases of any sort have been traced to the presence of either infusoria, entomostraca or other microscopic animal life in drinking water? In answer two cases are cited which have been noted in recent reading. The city of Dorpat in Russia suffered an epidemic outbreak of a serious form of fever which was traced to the presence of *paramæcia*. Whether they were the agents producing the disease or simply accompanied more serious causes is immaterial. The one fact for microscopists to remember is that the outbreak of a serious epidemic traced directly to the drinking water was accompanied by their presence in the water in large quantities.

The second case is that of the city of Boston where outbreaks of diarrhœa, dysentry and other bowel complaints are stated to have been accompanied by the presence in the water supply of certain of the entomostraca in large quantities.

*The vegetable forms met with are numerous and among the more important may be mentioned first of all the bacteria. We will also find confervoid algæ of various sorts, including occillatoria, nostocs, palmellaceæ, desmids, diatoms and others. The vegetable forms will, as we have already seen in the case of animals, present many different characteristics, and in order to fully comprehend their real import we must cultivate a hitherto neglected branch of botany. The confervoid algæ are found in ponds and pools and may generally be distinguished by their greenish color. Some varieties are, however, nearly colorless. Many of them are not considered to be specially harmful. The oscillatoria and nostocs when decaying are the cause of the pig-pen odors which have been frequently observed. That portion ot the water supply of the city of Boston which includes the Mystic ponds has on several occasions been infected with smells very much such as arise from an illy kept pig-pen. Such investigation as has been made traces this odor to the presence of the above mentioned algæ. The same thing has been met elsewhere and traced to the same cause.

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*See The Rotifera, by Hudson & Gosse. Now publishing in parts by Longmans & Co. 4 parts out. The chapter on Habits and Haunts of the Rotifera is of special interest to the general biologist.

*See Dr. Wolff's paper on Sanitary Examination of Drinking Water as above.

*See paper by Dr. Wolff above referred to, Parke's Hygienne and Nichols' Water Supply, Chemical and Sanitary.

Professor Farlow, of Harvard, has studied this whole subject very carefully, and his exhaustive paper in the Massachusetts State Board of Health Reports * is cited as a model for this kind of study. In his paper he states, in effect, that the most injurious vegetable substances found in drinking water are the blue-green nostocs above referred to.

The bacteria are of special interest to every biologist who makes the sanitary value of potable water the subject of investigation. Not only because of their relation to certain infectious diseases, but because of the unique system of biological analysis, dependent upon their presence, recently devised by Dr. Koch. The bacteria stand at the foot of the scale of vegetable life. For a long time their true position was a matter of uncertainty, and the subject of controversy. It is now, however, generally admitted that they are algae, and may be referred to the domain of botony. They were discovered two hundred years ago by Leuwenhoeck, but their correct position in the general system of classification has only been made out within the last few years by Cohn and Warming. Pasteur, Koch and others have investigated their pathological relations, and recent discoveries relative to the part which these microscopic algae play as producers of disease have rendered them of vast importance.

The bacteria are mainly unicellular, devoid of chlorophyl, and are classified by Cohn into four genera, as follows :

1. Spherobacteria or globular forms.
2. Microbacteria or minute rods.
3. Desmobacteria or filaments.
4. Spirobacteria or twisted or spiral filaments.

Of the first we have the well known genus micrococcus, of which there are three species. The second has but one genus, bacterium,

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*Supplement to Report for 1879.

of which two species are known, the Bacterium termo and Bacterium lineola. In the third variety we have the species Bacillus and Vibrio. The fourth class spirobacteria includes the two species, Spirillum and Spirochaete. Some farther sub-divisions are made, but the above answers our present purpose. Those who desire the complete classification should consult Dr. Sternberg's translation of Magnin, where Cohn's classification may be found complete.*

The literature of the bacteria has become very extensive, and as it is so comparatively recent, some interested members of the Section may desire to know where it can be obtained. The attention of such is directed to the work published last fall by Dr. Dolly, a former resident of Rochester, on the * "Technology of the Bacteria," where the complete bibliography of the subject may be found.

The method of water analysis designed by Dr. Robert Koch, is one of the many ingenious devices in this field by the greatest of the modern biological workers. Its detail has been recently described in the "*Lancet*" by Dr. G. Bischof, from whose paper the following account is extracted : †

" I.—Collection and transport of samples of water.

1. A number of flasks of 100 cubic centimetres capacity are plugged with cotton-wool and sterilized by heating in an air-bath for one hour to 150–180° C. They are used after cooling for the collection of samples of water. Pipettes, glass plates, etc., are similarly sterilized by being inclosed in sheet-metal boxes, with a tightly fitting lid of suitable dimensions, and heated in the air-bath as above. 2. When filling a flask so prepared with a sample of water, the plug of cotton-wool is carefully taken out and held between the fingers of the left hand, without touching the lower part of the stopper or turning it upward. Some thirty cubic centimetres of the samples are filled in and the cotton-wool is at once replaced. 3. The following precautions should be taken in filling the flasks : (*a.*) From a tap or the like the water is made to run to waste for three or four minutes, and then directed into the flask, if possible without touching its side. (*b.*) From a reservoir, stream, etc., the water is collected by means of a sterilized pipette and then filled into the flask as above. 4. The flasks should be so carried during transport as to prevent contact between the water and cotton-wool. 5. As

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*The Bacteria, by Dr. Geo. M. Sternberg, Surgeon U. S. Army.

*Published by S. E. Casino & Co.

† See Sanitary Engineer for Dec. 31, 1885.

far as possible, all samples should be mixed with the nutritive gelatine, etc., (II., 2,) within a few hours after their collection.

II.—Examination of a mixture of the water to be tested and nutritive gelatine spread on a glass plate.

1. Preperation of nutritive gelatine: One kilogram of raw minced beef is mixed with two litres of distilled water in a flask, and left to stand for twenty-four hours surrounded by ice. The liquid is then squeezed, by means of a suitable press, into a flask, where it is mixed with 200 grains of ordinary white gelatine, twenty grains of peptone, and ten grains of common salt. After standing for a short time, the ingredients are dissolved by gently heating the mixture, which is next neutrilized by sodic carbonate. It should be rather alkaline than acid. The flask is plugged with cotton-wool, and the contents are heated in Dr. Koch's apparatus for sterilizing by steam on two consecutive days for half an hour each day. The contents are now passed through a paper filter in a hot-water funnel, and about ten cubic centimetres of the light yellowish filtrate filled into each of a number of sterilized test tubes provided with cotton-wool plugs. These test tubes must once more be sterilized by steam on each of three consecutive days for rather less than fifteen minutes. Nutritive gelatine thus prepared solidifies at the ordinary temperature, and is kept in test tubes ready for use. If the latter remain perfectly clear after a few day's standing, sterilization has been complete. This can be further confirmed by a blank experiment. 2. Application of the nutritive gelatine for testing water: (*a.*) The contents of some of the above test tubes are liquefied by immersion in water of about 30° C. Mix the water in the sample flask by gentle agitation, remove the plug of cotton-wool as above, (I., 2,) and introduce as rapidly as possible into the test tube by means of a sterilized pipette, the quantity of water intended to be used for the experiment, at once replacing the cotton-wool. The water and gelatine must now be intimately mixed by bringing the test tube repeatedly into an almost horizontal position, imparting to it at the same time a screwing motion. It does not matter if the mixture at this stage touches the cotton-wool. (*b.*) A sheet-iron box is filled with glass plates which have been rinsed thoroughly and sterilized as above, (I., 1.) After cooling, the box is placed on its side and opened. A plate is taken out, reversed, and placed in a perfectly horizontal position on another glass place which forms the cover of a glass dish. The latter has been *completely* filled with water and ice, and rests on a tripod, which can be leveled

by means of screws. (*c.*) The cotton-wool is removed from the test tube, the open end of the latter passed once or twice through a Bunsen flame and the liquid mixture poured on a glass plate in such manner as to form, after solidifying, as nearly as possible a rectangle, the surface of which can be readily measured, and is at least half an inch distant from the sides of the plate. Place a bell-shaped glass cover at once over the plate for a few minutes. until solidification has taken place. (*d.*) The plate is transferred to a moist chamber, consisting of a glass dish with a dish of moistened filter-paper at the bottom. A glass rest is placed on the paper to support the gelatine plate, and covered by an inverted glass dish slightly less in diameter than the other and resting on the paper. (*e.*) The sample thus prepared is kept for two or three days at a moderate temperature, until the colonies have sufficiently developed. A basement-room answers well for the purpose, on account of uniformity of temperature. It would probably he convenient to lay down the rule that the development of colonies be always determined after an incubation in the moist chamber of *three days;* only should there be danger, in the case of very impure waters, of the colonies growing into each other, their number must be determined on the second day, which then should be stated. The approximate temperature during incubation may be noted with advantage. (*f*) The number of colonies is conveniently calculated per cubic centimetre of water. It is determined by placing the plate after incubation on a dark ground. A glass plate, divided into square centimetres and one-ninth of a square centimetre, is so arranged on a hinge that it can readily be made to cover the gelatine plate without touching it. If there are many colonies their number is counted in some of the smaller squares, the average being calculated on the entire area of the gelatine. With few colonies the larger squares should be made use of, or indeed the colonies counted all over the plate. A lens sliding on the top of the graduated glass plate assists in the discovery of the smaller colonies. Recently glass plates have been manufactured, which are provided with a slightly projecting rectangle of enamel of uniform area. I have no experience with them, but if they stand the sterilization well they would save the estimation of the total area, provided it be covered all over with gelatine. (*g.*) Lastly, the number of *liquifying* colonies over the whole or part of the area of gelatine has to be counted as before. These colonies are probably due to micro-organisms which are in connection with putrefactive changes, and they are distinguished, after a little practice, by holding and moving the glass plate slightly inclined before the eye.

III.—Remarks on the preceding method, translated from Dr. Becker's treatise.

1. The germs contained in the water under examination are *separated* by mixing with the nutritive gelatine. When the latter solidifies they are deposited and fixed, each becoming the centre of a colony. 2. Each distinct colony thus obtained is a pure culture resulting from one single germ. 3. The number of developed colonies, therefore, bears a a ratio to the germs contained in the sample. 4. Each sample of water differs quantitatively and qualitatively as to the bacterial germs it contains. Developed colonies show differences, visible even to the naked eye, in their color, their mode of development, liquefaction of the gelatine, formation of gases, etc. 5. The micro-organisms forming each colony may be examined more minutely by abstracting a minute portion (if necessary, with the assistance of the microscope) by means of platinum wire, which has been previously heated to redness. Such matter is mixed with a drop of distilled water on a thin glass cover and further treated as explained hereafter (V.) 6. Certain forms of micro-organisms are invariably found in each sample of water, and with some practice a colony foreign to it may be detected without any great difficulty. 7. Water which is rich in products of decomposition is not suitable for drinking; similarly, water rich in the agents causing decomposition is unsuitable. It is not impossible that a sample of water may appear quite unfit for drinking because it contains an unusually large number of micro-organisms, whilst chemical analysis fails to give warning. 8. The method appears peculiarly suited to the examination of the efficiency of filters, the germs in the water before and after filtration being compared."

Such examinations have lately been made at Berlin, and the results are given in the following table, showing the monthly average of bacteria in one cubic centimetre of water before and after filtration.*

MONTH.	BEFORE FILTRATION.	AFTER FILTRATION.	IN ONE OF THE CITY HOUSES.
July	1064	265	409
August...	1440	277	157
September.......	2496	63	144
October..........	3251	21	50
November	466	27	26
December	811	57	34
January	864	39	29
February........	865	98	84
March........ ..	1843	16	34

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* Paper in the *American Monthly Microscopical Journal* for April, [illegible], "Notes on the Biological Examination of Water, etc."

As to the number of bacteria allowable in what is called good water, Dr. Koch has said:

† "A large number of micro-organisms indicate that the water has received admixtures in a state of decomposition and loaded with micro-organisms, impure tributaries, etc., which might contribute, in addition to the many harmless bacteria, also pathogenic forms, that is, infectious matter. Experience thus far has shown that in good waters the number of germs capable of development varies between 10 and 150. As soon as the number considerably exceeds this limit, the water must be suspected of receiving contributions from polluted sources. If the number reaches or exceeds 1,000 I should not permit its use as drinking water, at least not in times of a cholera epidemic. The number 1,000 is chosen by me as arbitrarily as has been the case in selecting the limiting values in chemical analysis, and I allow each one to change it according to his convictions."

An excellent test of the presence of organic matter, is that known as the sugar test of Heisch. For this purpose ten grains of pure granulated sugar are added to about five ounces of the water to be tested. A perfectly clean bottle should be filled with this and tightly corked to exclude the air. Ground glass stoppered bottles should be used when they are available. Place the bottles in a window where they are exposed freely to daylight but not to the direct rays of the sun, and maintain as nearly as possible a uniform temperature of 70° F. If the water contains much organic matter an abundance of whitish specks will be seen floating about in the course of a day or to, and the more organic matter there is, the more marked will be this appearance. After several days these little particles settle to the bottom of the bottle, where they appear as white floculent masses. If the water is *very* bad after a week or two the odor of rancid butter may be perceived.

By this simple test in conjunction with the use of the microscope much information relative to the quality of potable waters may be gained. The present writer deems it of special value for purposes of comparison. For instance, it is his habit to put up at the same time and under the same conditions several bottles, some of them representing waters whose constituents are well known while others are the unknown samples whose sanitary values are to be determined. After several days samples of each are taken out with proper precautions as to sterilization of pipettes, etc., and examined under the microscope. Such examination has always thrown light on the real character of the water under consideration.

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† See paper as above in *Microscopical Journal.*

In the present writer's experience as Sanitary Engineer some very interesting incidents have occurred in connection with examinations looking towards the selection of a source of water supply. At a town in Texas, for instance, of from 12,000 to 14,000 inhabitants, the city authorities proposed at one time to turn a sewer into the Trinity river just above the crib in the middle of the stream from whence the water supply was to be derived. The Trinity at that point is a stream varying from a dry weather flow of almost nothing to a flood flow four to six times as great as that of the Genesee here at Rochester. No special reason existed for turning a sewer into the river above the water works source of supply, and indeed, all the sewerage of the town was finally turned in at a point far below, and from what is known of the topography it may be stated that this was done without special additional expense. The fact rhat a proposition of this sort is seriously considered by the municipal authorities of any town simply illustrates the great lack of popular information as to the sanitary value of potable water.

Another case: A town in the neighboring State of Pennsylvania, called upon the writer about a year and a half ago to advise as to the selection of its water supply and as to the design of works for utilizing such supply. Arriving on the ground it was found that the local controlling board had proposed to use the water of a small stream which in the nature of things must take all the ground drainage from a cemetery of considerable extent. The cemetery being located on a side hill, sloping towards the stream with gravelly soil and hard pan underneath. The controlling board had pointed out to it some of the evil results likely to follow such a selection, and was advised to look farther for a source of supply.

At Westfield, N. Y., a town of 2,500 inhabitants, a system of water works has been in use since 1874. A few months ago the writer was called upon to advise the town authorities either as to increasing the capacity of the works now in existence or else as to the construction of new works.

The present supply is derived from a well sunk ten to twelve feet into what was originally a bog, the water therefrom being pumped by *windmill* into a shallow reservoir, (depth of from four to five feet) from whence it is distributed to the consumers The question before the Board of Trustees was as to the propriety of sinking anotherwell in the bog and as to the construction of another shallow reservoir. It was claimed by the town authorities that this well was in reality supplied from a deep-seated spring and not from the surface and ground water of the bog. An examination, however, revealed the fact that the well was carried down through the peaty matter forming the soil of the bog to a close-textured shale rock and it was thought to be very improbable that any spring rose through this shale. Immediately south of the well, the limit of the bog in that direction was reached with an abrupt rise of from ten to twelve feet, beyond which the ground rose rapidly to a street with several houses, surrounded by barns, pig-pens, privies, etc., and at a distance of about 200 feet from the well. From the abrupt rise near the well to these houses and outbuildings there is a gravelly soil with the same impervious shale a few feet below. It was found on inquiry that diseases of the zymotic type were prevalent wherever the water from the public supply was used. With these facts gained as the result of examining the matter, the writer predicted that the water of their public supply would be shown on analysis to contain more organic matter than was compatible with safety, and the trustees were advised to abandon this well entirely and construct works with the Chautauqua creek, a clear mountain stream near by, as the source of supply.

An examination with the microscope in conjunction with an application of the sugar test above detailed more than justified the opinion originally expressed. As matter of interest it may be stated that at the time of the general examination the reservoir contained literally millions of tadpoles and the interesting biological question was at once raised as to the real import of this fact in settling the sanitary value of the Westfield water.

But time presses and we must pass to the final conclusions, which are to this effect: that chemical analysis can determine but little relative to the dangerous character of the organic contamination found in potable water, that this part of the question can generally be settled by the use of the microscope. Farther, if we possessed full information as to the real significance of all the substances, both organic and inorganic found in the sediment, the determination of the sanitary value of potable water would become a microscopic study, with the use of chemical processes to clear up occasional uncertainties, instead of being as at present a chemical study with the microscope as an accessory.*

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* See Report by Dr. Chas. Smart, U. S. A. in National Board of Health Repcrt for 1882.

Relative to our own water supply the writer suggests the following as worthy of consideration:

† The thorough chemical study of the Hemlock lake water made by Prof. Lattimore several years ago has shown it to be, so far as chemical analysis can, of exceptional purity. Such microscopical analysis as Prof. Lattimore was able to make at that time also exhibits the same truth. We should remember, nevertheless, that Hemlock lake is a comparatively small body of water, its mean area being rather less than 1,850 acres. Its depth, however, is great, being for a considerable portion of the lake from 40 to 70 feet. The water works conduit now takes the supply at a depth of 30 feet and may be extended as occasion demands. The whole body of water is still comparatively small even though the depth is considerable. The water shed is fairly well settled and sources of organic contamination are likely on the whole to increase somewhat from year to year. From whence it follows that we may expect changes in the character of the microscopic life. It seems a reasonably evident proposition, therefore, that the biology of our water supply may be profitably studied. It is to be regretted that the means at Prof. Lattimore's command did not permit of making such a study in connection with his chemical study of ten years ago. It may be said, however, that in the last ten years biological methods have advanced greatly in completeness and in consequence of this advance any study made at that time would be considered incomplete now.

We may further make note of the general proposition that at Hemlock lake relatively *small* amounts of contamination will be *likely* to produce more serious effects than they would if the whole body of water were larger.

A determination of the sanitary value of this water would require the careful and systematic study of a number of important biological questions, some of which are perfectly general in their character. A few such questions have been jotted down without special regard to order as follows:

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† See Reports as follows:

1°)—Report on the Recent Peculiar Condition of the Hemlock Lake Water Supply. By S. A. Lattimore, Ph. D., L. L. D., Professor of Chemistry in the University of Rochester, in the Annual Report of the Executive Board of the City of Rochester for 1876.

2°)—Report on the Water Supply of the City of Rochester, by Prof. S. A. Lattimore, in Annual Report of the Executive Board for 1877.

3°)—Also See Report of J. Nelson Tubbs, Chief Engineer Rochester Water Works for same years. To be found in Annual Report of Executive Board.

1°)—Do any of the ordinary bacteria of putrefaction ever change into pathogenic bacteria, and if so under what conditions? *

2°)—It has been asserted that pathogenic bacteria cannot exist in the presence of putrefactive bacteria. Is this statement at all true, and if so what are the specific cases?

3°)—Under what conditions are infusoria developed in our water supply and does it now contain any which are pathologically objectionable? If so, what are they and what is the life history of each?

4°)—Aside from the bacteria is it probable that any of the other algæ which exist in our water supply are pathologically objectionable?

5°)—What is the real sanitary significance of the entomostraca, rotifera and other microscopic life in our water supply, and what probability is there of their transmitting endo-parasitic diseases to human beings?

6°)—What is the habit, period of recurrence and life history of all endo-parasites affecting the entomostraca, rotifera and all other minute life in our water supply, if any?

7°)—There should be made for a number of years a series of observations to determine whether the presence of any of these organisms in large quantity has any effect on the general public health, and if so, what effect?

8°)—Make a systematic study of the fish inhabiting the water supply, their diseases, etc., in order to determine whether their presence ever effects the public health injuriously, and if so, ascertain the nature of such effect.

9°)—There is at the head of Hemlock lake a swamp of about 120 acres, which at the time of high water each year is practically sub-

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* In asking this question the writer had in mind the quite generally received opinion that the ordinary bacillus of a hay infusion may, under certain conditions, be transformed into the bacillus anthracis. This opinion is based primarily on the observation of Dr. Buchner, who states in a paper published in 1880, that he succeeded under certain detailed conditions in producing such transformation.

The hay bacillus and bacillus anthracis are both classified as bacillus subtilis. (See Plate 3, Fig. 14.)

Since penning this question the writer has received a copy of the third edition of Dr. Klein's Micro-Organisms and Disease. In the chapter "On Relations of Septic to Pathogenic Organisms" Klein casts considerable doubt on the accuracy of Dr. Buchner's observations. His objections are based chiefly upon observed technical differences in the two bacilli, and considers that the results obtained by Dr. Buchner from inoculation experiments were due to accidental contamination of the cultures, cultivations of genuine bacillus anthracis having been carried on in his laboratory while the experiments with hay bacillus were in progress.

Klein concludes his argument with the following:

"If Buchner could show us that in a laboratory in which for some considerable time anthrax cultures, anthrax animals, and examinations of anthrax bacilli ultimately yields a fluid which produces typical anthrax, then I should be, perhaps, prepared to concede his proposition of a transmutation of hay bacillus into bacillus anthracis. Such a proposition is of the widest importance, and. therefore, its proof ought to be beyond cavil; there ought to be no chance of a possibility of error. Such proof Buchner has not given, and I cannot, therefore, accept his interpretation."

merged, while in low water it is nearly dry. This swamp is probably the breeding place of rhizopods, infusoria algæ, and in fact of nearly everything in the way of minute life found in the water. Does the presence of this swamp affect the water as received for consumption here at Rochester injuriously? If so, what is the specific injury and how may it be prevented?

10°)—There are about 80 cottages around the margin of the lake, with barns and other outbuildings. A portion of the refuse of these cottages, barns, etc., has previous to last year, gone directly into the lake and possibly some of it finally passed down the throats of our citizens.

Last year, however, under authority of a general State law, a system of sanitary protection was inaugurated by which the wastes from these various places are carried away to a point below the foot of the lake and treated. Are there still any undiscovered sources of contamination about the buildings, and if so, what are they?

11°)—In the course of his ordinary duties as assistant engineer of the Rochester Water Works, the writer made last spring a sanitary survey of the various sources of contamination about the lake. At that time hogs were kept at several points along the lake in such manner as to allow their refuse to drain into the lake. This seemed to him a flagrant violation of elementary sanitary principles. In addition to hogs, which possibly as a matter of prejudice merely, the writer considers the worst, there were several places where the drainage of large farm barnyards passed into the lake.

Under authority of the general law above referred to, the State Board of Health has framed a code of rules for the sanitary protection of the lake and most of the more serious sources of contamination have been removed.

The topography is such, however, that the absolute prevention of such sources of contamination will in the nature of things be difficult, at any rate so long as the water shed is used for farming and as habitation for human beings generally.

Ultimate relief from this difficulty may be obtained by purchasing the water shed and laying it waste. This heroic treatment has already been adopted in the case of water sheds supplying important foreign cities. The Hemlock water shed is not densely populated and such treatment will not be necessary if the inhabitants are properly impressed with the importance of cleanliness. It should, however, be determined what effect a diseased condition of domestic animals would have, if any, together with an investigation as to special remedies.

In all such matters we need greatly to have established a series of limiting values and for this purpose it appears that Dr. Koch's method of quantitative determination of the bacteria has special value.

12°)—* Prof. Pumpelly has shown that the filtering capacity of various soils has important bearing on many questions, the solution of which is here indicated as of interest and probable value. A complete biological survey would therefore include an investigation of this matter with special reference to the Hemlock drainage area.

13°)—The question has been raised as to whether the paramæcea are really indicative, *in any case*, of sewage contamination, and whether they are not frequently the accompaniment of *harmless* organic contamination. It appears to the present writer that light can be thrown on this subject by a series of experiments. For this purpose proper infusions of various kinds may be prepared artificially, and a daily study of such for a considerable period ought to throw light on the question of their special occurrence in sewage contaminated waters.*

The above is sufficient to indicate a few of the questions, of which a rational explanation is essential, for a full understanding, of some of the complex problems arising in the practical management of a public water supply.

In the writer's opinion the Microscopical section of the Academy of Science could hardly find a more fascinating or more prolific field than to enter upon a year's study of the biology of our water supply. It is reasonably evident that in such a study the microscope is the one necessary instrument of precision, and it is hoped that it has been shown that such a study is a matter of utility and hence well worthy of the best efforts of the Section.

To the objection that the investigation here outlined presupposes an elaborate and expensive laboratory at the command of the Section, it is answered that this is an error, and the statement of * Prof. Leidy, that an instrument costing $50 will do everything required of a microscope, in the production of such a work as his memoir on the Fresh Water Rhizopods, is cited as proof of the correctness of this opinion, and it may be safely concluded that the instruments and accessory apparatus now owned by the individual members of this Section will suffice for such a study as is here contemplated.

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* Report on the Results of an Investigation into the Filtering Capacity of Soils. By Raphael Pumpelly. National Board of Health Reports for 1881 and 1882.

* See Kent's Manual of the Infusoria.

* Fresh Water Rhizopods of North America, by Joseph Leidy, M. D., page 3 of Introduction.

The farther objection may be made by some medical men that the field here proposed to be covered is one pertaining especially to the work of the specialist in pathology and hygiene. The attention of such may be called to the fact that the finest studies of recent times in this direction have been made by Pasteur, the chemist, and Tyndall, the physicist, neither of whom have any claim to the special training of a physician. Their attention may be further directed to the fact that modern biological literature contains no more magnificent generalizations than those of Herbert Spencer, the engineer.

What is really required is the patience to observe one object until its whole life history is determined, together with an analytical turn of mind to insure proper interpretation of phenomena.

It has already been shown in general terms that many different lines of investigation require to be pursued in order to make such a study really effective. This presupposes a number of observers working on the various lines. Such a study, therefore, if undertaken by ihe municipality and paid for at the current rates for such service would become very expensive. In the present condition of the municipal finances, and of public intelligence relative to the importance and real value of such work, there is no probability of obtaining any municipal appropriation.

An investigation of this character if made at all must then be under the auspices of some scientific body, and made as a contribution to the scientific literature of the day. No such body exists in Rochester except the Academy of Science, and the Microscopical Section of the Academy would naturally undertake such a work.

In conclusion the writer takes occasion to express his appreciation of the honor conferred upon him by the invitation to read a paper berore this Section on the biology of our water supply, especially since he is neither a member of the Academy nor a person known as a microscopist, and he sincerely hopes he has repaid in part the indebtedness which he is under to the Section for valuable information received by attending several of the monthly meetings.

EXPLANATION OF PLATES.

PLATE 1.

All the species figured in this plate are grass-green, and produce no injurious effect on drinking water.

Figs. 1-3. Chara coronata, Var. Schweinitzii, A. Br. Fig. 1, life size; Fig. 2, branch with antheridia, a, and sporangia, b, magnified slightly; Fig. 3, sporangium containing spore magnified 50 diameters.

Figs. 4, 5. Lemna polyrrhiza, L. Fig. 4, life size; Fig. 5, the same seen from the under side, and slightly magnified.

Figs. 1-5 were drawn from life by Mr. C. E. Faxon.

Fig. 6. Cosmarium Botrytis, Menegh. From Ralf's British Desmidieæ; a and b are two unicellar individuals, which are represented in c and d respectively as having ruptured, their contents having united to form the spore, s. Diameter of spore, $\frac{1}{379}$ of an inch.

Fig. 7. Spirogyra from Luerssen's Handbuch; c, chlorophyl bands in the cells; s, spores formed by the union of the contents of two cells. Magnified 240 diameters.

PLATE 2.

All species figured in this plate are of a bluish-green color, and in decay give off a pig-pen ordor.

Fig. 1. Coelosphaerium Kuetzingianum, Naeg., and Anabaena Flos-aquæ, var. circinalis, Kirchner. From the surface of Basin No. 3, South Framingham, October, 1879. Magnified 300 diameters.

Fig. 2. The same, showing details of Anabæna; a, spores; b, heterocysts.

Fig. 3. A portion of Fig. 2, magnified 600 diameters.

Fig. 4. Coelosphærium. From Fig. 1, magnified 600 diameters. A gelatinous halo is usually found round the colonies when seen with this power.

Fig. 5. Clathrocystis æruginosa. Henfrey. From Fresh Pond, Cambridge, October, 1879. Mature colony magnified 400 diameters.

Fig. 6. Lyngbya Wollei, Farlow. From Horn Pond, Woburn. A portion of two filaments magnified 400 diameters, showing the bluish-green disk-shaped cells, surrounded by a colorless sheath.

PLATE 3.

Eig. 1. Micrococcus prodigiosus. (Monas prodigiosus. Ehr.) Spherical bacteria of the red pigment aggregated in pairs and in fours; the other pigment bacteria are not distinguishable from this one.

Fig. 2. Micrococcus vacinæ. Spherical bacteria from pock-lymph in a state of growth, aggregated in short four to eight-jointed straight or bent chains, and forming also irregular masses.

Fig. 3. Zooglea-form of micrococcus, pellicles or mucus stıata characterized by granule-like closely set spherules.

Fig. 4. Rosary-chain (Torula-form) of micrococcus ureæ, from the urine.

Fig. 5. Rosary-chain and yeast like cell masses from the white deposit of a solution of sugar of milk which had become sour.

Fig. 6. Saccharomyus glutinis, (Cryptcoccus glutinis. Fersen.) a polluting yeast which forms beautiful rose-colored patches on cooked potatoes.

Fig. 7. Sarcina spec, * from the blood of a healthy man; **from the surface of a hen's egg grown over with Micrococcus lutens, forming yellow patches.

Fig. 8. Bacterium termo, free motile form.

Fig. 9. Zooglea-form of Bacterium termo.

Fig. 10. Bacterium pellicle, formed by rod-shaped bacteria arranged one against the other in a linear fashion from the surface of sour beer.

Fig. 11. Bacterium lineola, free motile form.

Fig. 12. Zooglea-form of B. lineola.

Fig. 13. Motile filamentous Bacteria, with a spherical or elliptical highly refringent "head," perhaps developed from gonidia.

Fig. 14. Bacillus subtillus, short cylinders, and longer, very flexible motile filaments, some of which are in process of division.

Fig. 15. Bacillus ulna, single segments and longer threads, some breaking up into segments.

Fig. 16. Vibrio rugula, single or in process of division.

Fig. 17. Vibrio serpens, longer or shorter threads, some dividing into bits; at * two threads combined.

Fig. 18. Swarm of V. serpens, the threads felted.

Fig. 19. Spirillum tenue, single and felted into swarms.

Fig. 20. Spirillum undula.

Fig. 21. Spirillum volutans, * two spirals twisted around one another.

Fig. 22. Spirochoete plicatilis.

All the figures in plate 3 were drawn by Dr. Ferdinand Cohn with the immersion lens No. 9 of Hartnack, Ocular III. representing a magnifying power of 650 diameters.

Plates 1 and 2 with the explanations are from a paper "On Some Impurities of Drinking-water Caused by Vegetable Growths," by Prof. W. G. Farlow, of Harvard University, printed with the Report of the Massachusetts State Board of Health for 1879.

Plate 3 with the explanation is from the *Microscopical Journal.* Vol. XIII. N. S., Pl. V.

The writer has already called attention by foot notes to his indebtedness to the paper of Dr. Wolff in the Eight Annual Report of the State Board of Health of Connecticut, "On the Sanitary Examination of Drinking-water." This paper is an excellent resume of the subject, and while the writer believes that in the present state of knowledge Dr. Wolff is not justified in a few of his opinions, still the paper as a whole is so valuable, that great pleasure is taken in specially acknowledging a considerable indebtedness in the preparation of the present paper.

Dr. Wolff's paper on Park River Nuisance, in the Seventh Annual Report of the same Board, is of interest and value to students of the Bacteria.

THE DESTRUCTIVE ENERGY OF THE TINCTURE OF THE CHLORIDE OF IRON ON THE TEETH.

An original paper of conspicuous merit with the above title was read before the New York Odontological Society, by George W. Weld, M. D., D. D. S.

As the researches of Dr. Weld in this direction possess many points worthy of the careful consideration of every dentist and physician, the salient features of the paper are cheerfully published.

Dr. Weld declares that clinical observation shows that water increases the destructive energy of the tincture of the chloride of iron upon the enamel of the teeth more than any other fluid, and as an illustration he states that the effect of adding water to a simple solution of the chloride of iron, *devoid of free acid*, is to give basic salts of iron and the separation of free hydrochloric acid

Dr. Weld showed conclusively that the tincture of the chloride of iron of the officinal strength had but little, if any, effect upon the enamel structure of a tooth, when immersed in the same for a period of twelve hours, but that when immersed in a solution of the tincture and water in proportion of one ounce of water to one drachm of the tincture, the enamel was materially injured in five minutes.

As an illustration of this phenomenon the Doctor stated that, when a piece of zinc is immersed in strong sulphuric acid (H_2, SO_4,) it has been observed that the acid has no effect upon the structure of the zinc, but if a little water be added to the acid the zinc is at once destroyed. So that it is not entirely a matter of the strength of the fluids, so far as the quantity of iron or acid is concerned but a matter of constitution or solubility.

The zinc in the strong sulphuric acid is protected in the same manner that the tooth which is immersed in the strong tincture of the chloride of iron is protected, viz: The surface is blackened up with the basic salts of iron insoluble in alcohol, and which prevents chemical action. In the case of the zinc it is the sulphate of zinc resulting from the first action, and insoluble in the concentrated acid, that forms a protecting coat over the surface of the zinc; the addition of water dissolves this protecting sulphate, and renders further chemical action possible. In the case of a tooth immersed in the strong solution of the tincture a similar action takes place, viz: the oxide of iron first formed protects the enamel from immediate chemical action on account of its compact adherence to its surface.

To illustrate still further, Dr. Weld called attention to two specimens of teeth on the card* which had been immersed in the tincture and alcohol, and compared them with teeth which had been immersed in the tincture and water. Here it was observed that although the alcoholic solution used contained the same quantity of the tincture and possessed apparently the same relative strength and immersed for the same length of time, yet no injurious effect was produced on the lime-salts of the teeth. The reason is attributed to the fact that alcohol is a dehydrating compound and that the peroxide which is formed in the alcoholic solution is of the anhydrous form, and in character very compact, adhering closely to the surface of the tooth, thereby preventing immediate chemical action, whilst on the other hand, in the presence of water the peroxide* which is precipitated is the hydrated form and flocculent in character, does not so well adhere to the surface of the tooth, leaving the free hydrochloric acid in the solution to unite with the lime-salts with greater facility.

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*A glass case presented to the Odontological Society containing sixty-four teeth, showing, with various modifications, the destructive energy of different acids and iron compounds on the enamel.

There appears then to be two forms of the peroxide or iron, viz: (1) The hydrated form ($Fe_2(OH)6$) formed in the water solution, which is flocculent and non-protecting to the teeth. (2) The anhydrous form (Fe_2O_3) formed in the alcoholic solution, which is heavy and compact, and protects the surfaces of the teeth.

The following formula will show how the hydrated peroxide is formed from the anhydrous peroxide: ($Fe_2O_3 + 3H_2O = Fe_2(OH)6$).

The teeth immersed in an ounce of the elixir of the pyrophosphate of iron with one drachm of the tincture of the chloride added for a period of twenty-four hours, produced apparently no chemical effect on the enamel; but with the same quantity of water and the tincture the enamel was completely destroyed. The elixirs are composed of nearly twenty-five per cent. of alcohol, the presence of which, as observed in the strong solution of the tincture, and in the alcoholic solution, affords a protection to the enamel of the teeth in the manner described. But it is to be noted that when a tooth is immersed in a solution of the tincture and simple syrup, in the above proportions, the enamel is but little affected. This is due to a mechanical reason or a condition of fluidity of the solution, i. e., the presence of the sugar in solution coats the surface of the enamel, preventing the chemical affinity between the acid, or perchloride of iron, and the lime-salts in the teeth.

The manner in which syrup modifies the destructive energy of the tincture on the enamel was beautifully illustrated by the effect produced on the specimens of teeth which had been immersed in a weak solution of phosphoric acid, viz: "Hosford's acid Phosphate," "Phosacid," and "Phospho-Muriate of Quinine Compound." The first two of these proprietary medicines are water solutions, and the effect is to destroy the enamel of a tooth in an hour, whilst the last one, which is a syrup solution (each fluid drahm containing two grains of free phosphoric acid) produces but little, if any, injurious effect on the enamel in twenty-four hours.

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*Synonyms: Ferric Hydroxide. Hydrated sexquioxide of iron.

Equally interesting was the effect produced on the enamel of the teeth which had been immersed in a solution of the tincture and the weak alkaline waters (notably Vichy.)

When a drachm of the tincture is added to an ounce of Vichy-water, a slight effervescence occurs, indicating that the bicarbonate of soda contained in the water has neutralized a part of the free acid contained in the tincture ; in consequence, when a tooth is immersed in such a solution, the destructive energy of the iron is to a great extent modified. Unless the specific nature of the tincture of the chloride of iron is materially affected (and the peculiar odor of the tincture remains) there seems to be no reason why this preparation of iron, at least in all cases of anaemia, should not be administered in combination with Vichy-water.

There are then three menstrua which may be employed to modify the destructive energy of the tincture of the chloride of iron on the enamel of the human teeth. The first is alcohol in some form. The second is Vichy-water, which neutralizes to a slight extent the free acid contained in the iron. And the third is some form of an elixir or simple syrup.

CONDUCTOR'S DEPARTMENT.

APOLOGETIC.

For reasons that concern the publisher and printer only, this number of the ODONTOGRAPHIC JOURNAL, like a cow's tail, is very much behind. As a consequence, matter that would have been news on the regular date of issue (July 15) has gone into the waste basket. The quantity of matter, however, is as great, or greater, than in any previous issue.

DR. WILHELM HERBST—RECEPTION AND DINNER.

The reception and dinner given Dr. Wilhelm Herbst, of Bremen, Germany, under the auspices of the First district dental society, at Mazzetti's (the place of the anniversary dinner last December), the evening of July 22d, was a grand success. About ninety members of the dental profession were present, every one of whom did all in his power to make the occasion a memorable one for Germany's best known operative dentist, who will take away with him many pleasant recollections of his visit to the adopted home of so many of his countrymen. At the close of Dr. Herbst's speech, he presented the society with a collosal wreath bearing ribbons of many colors, each ribbon beautifully embroidered in gold and silk and representing the German dental society contributing it. Every dental society in Germany was thus represented, the whole being designed as a tribute to the memory of the late Dr. S. C. Barnum, inventor of the rubber dam.

On the preceeding evening a little reception, a sort of preliminary introduction, was given the society's guest, at Dr. C. F. W. Bödecker's. In reply to Dr. B.'s introductory remarks, Dr. Herbst said that he had come from Bremen simply to show his "hobby;" that it had been of great service to him, and might in time prove of value to others. Remarks were made, also, by Drs. Kingsley, Dwinelle, McKellops, Brown, Bogue, Northrup and Walker. Others present were Drs. Heitzman, Levy, Atkenson, Carr, Perry, Darby, Pierce, Guilford, Rehwinkle, Hill, Lord, Timme, Littig, Abbott, Andrews, and many others whose names cannot now be recalled.

The reception committee, Drs. Abbott, Atkinson and Bödecker, deserve great credit for the admirable manner in which the programme was carried through.

ILLINOIS OFFICERS.

The following are the officers elected at the Illinois State Dental Society meeting held at Rock Island, May 11 to 14, '86 :

President—Dr. W. Magill, Rock Island.
Vice President—Dr. C. B. Rohland, Alton.
Secretary—Dr. J. W. Wassall, Chicago.
Asst. Secretary—Dr. Louis Ottofy, Chicago.
Treasurer—Dr. T. W. Prichett, White Lake.
Librarian—Dr. W. B. Ames, Chicago.

The next meeting will be held at Jacksonville, the second Tuesday in May, 1887.

An urchin, with a swelled face, was asked what ailed him. "Dunno ; dad says one of my teeth has got the belly-ache."—*Ex.*

"SOPORATIVE."

The *Dental Cosmos* for May disposes of "Soporative," a proprietary anæsthetic, pretty effectually. A sample of the stuff was sent Mr. Henry Trimble for analysis, which showed it to consist of "bromide of ethyl (gg.13 per cent) flavored with rose, and containing distinct traces of alcohol." Thus again, and for the ten thousandth time, are "years of labor and research" made of no avail.

GONE TO OREGON.

Dr. J. S. Walter, one of the best known and most highly esteemed members of the fraternity in Western New York, has gone to the Pacific coast to grow up with the country and practice dentistry. Dr. Walter has always been active in dental societies, and has aided materially in every important movement for the betterment of the profession in this state. He has served in many offices in the Seventh District Society and the Rochester Dental Club, and has been President of each. Our loss will prove an acquisition to both the profession and the public in whose midst he hopes to spend the remainder of his days. May that peace which he seeks, and which is said to pass all understanding, be his till Gabriel horns him home.

"PRACTICAL" AND "HUMANE."

A month ago, or more, we read in a daily paper that a commission, consisting of Messrs. E. P. Gerry, A. P. Southwick and Mathew Hale, had been provided for in a passed but as yet unsigned bill authorizing the said commission "to investigate and report on or before the fourth Tuesday of January, 1887, the most practical and humane method known to modern science of carrying into effect the sentence of death in capital cases." To the general reader this is of passing interest only, but to the dental reader it means more,—that the criminal of society must go, and make haste about it, too; for this same "A. P. Southwick" is none other than our "very own," of Buffalo, who is one, unless recently and greatly changed, with that old Greek thoroughbred who said, when serving on a similar commission several centuries ago, "Hanging is most excellent punishment for small crimes; for great ones, I know of nothing better." How it came about that our Buffalo friend got the appointment in question is one of the mysteries. Either the appointing power designed to perpetrate a joke on some peace society, or said A. P. S. has been drinking copiously of the milk of human kindness and cavorting with the turtle dove. Which? Let Echo be routed out and made to yield an answer.

A. S. M.

The American Society of Microscopists will hold its ninth annual meeting at Chautauqua, N. Y., Aug. 10–14, '86. The papers and exhibits will more than fill the allotted time unless some misfortune befalls those having the matter in charge—a thing that never has and is not likely to happen. Members of the American Dental Association who are a long way from home and in no hurry to return, will find the place of meeting and the occasion all that could be desired, whether for rest, social intercourse or scientific advancement in the subjects that usually come before this young but vigorous body.

AFFLICTED.

Dr. and Mrs. F. E. Howard, of Buffalo, mourn the loss of their only son, who was drowned while bathing in the river at Geneseo. A large circle of friends sympathize with them in their misfortune.

DENTAL SOCIETY OF THE STATE OF NEW YORK—OFFICERS.

At the annual meeting held at Albany, May, '86, the following were elected for the ensuing year:

President—Norman W. Kingsley, New York.
Vice President—Byron Rathbun, Dunkirk.
Secretary—J. Edw. Line, Rochester.
Treasurer—H. G. Mirick, Brooklyn.
Correspondent—W. A. Atkinson, New York.

The several committees will be announced in the October issue of this Journal, which will also contain the minutes in full.

The *Dental Eclectic* keeps abreast of its neighbors like a veteran.

PELLETS.

> "He turned his lofty soul to prove the Airiness of Air,
> And twisted skeins of logic 'round the Whatness of the Where."

He is now Sir John Tomes.

Iodol is fast taking the place of iodoform.

Dr. Leon F. Harvey, of Buffalo, has retired from the practice of dentistry.

Celluloid tapeworms are the latest achievement in medical quackery.

We are indebted to Dr. W. W. Walker for a copy of the First Society's "Souvenir."

The fifth annual announcement of the Chicago College of Dental Surgery is out.

Dr. Walker : It was—why, this stuff they find in tobacco—nic—
Dr. Pitts : Nicotine.

We are indebted to the author, Dr. E. S. Niles, for a pamphlet copy of *Dental Phosphorenesis.*

Life says of some shades of aching teeth : "Outwardly they are whited sepulchres, but inwardly they are ravening wolves."

One of them looked over the French bill of fare and asked, musingly: "Where are we, anyhow ? I've lost my place."

The National Druggist is one of the best advertising mediums in the country. The scientific character of its reading matter make it such.

The writer of New York letters to the *Archives of Dentistry* may wake up some morning only to find himself dead. Then he'll wish he hadn't.

Comrade A. M. Dudley's biographical sketch of Maj. Gen. W. S. Hancock outlines the career of that hero of the war briefly and in true soldierly style.

"Tooth Development" is the title of the leading paper in the *Dental Practitioner* for June. It is by Jennie R. Gould, D. D. S., and fully illustrated.

How about those suits in Connecticut in regard to the validity of letters patent for tooth crowns and bridge-work? We'd like to publish the decision if any was had.

Our attention has been called to the absence of a table of contents and title page to Vol. V. of this Journal. It will be issued with the October number as an extra.

Dr. R. B. Winder has been appointed professor of the principles and practice of dental surgery as applied to medicine, in the College of Physicians and Surgeons, of Baltimore.

The American System of Dentistry, in treatises by various authors, edited by Prof. W. F. Litch, is now in the press of Lea Bros., Philadelphia. Vol. I. is promised in the autumn.

Progress and *New York Medical Monthly* are the names of two new medical journals, edited respectively by Drs. Dudley S. Reynolds and J. Leonard Corning. The first is published at Louisville, the second at New York.

The following, overheard at a dental dinner, illustrates the power of mind over matter: A.—"Don't eat that, B.; you'll ruin your digestion." B.—"My dear fellow, what my appetite says is good my stomach has got to stand."

The members of the *Medical Press and Library Association* (St. Louis, Mo.,), in behalf of the *Weekly Review* gave a dinner, Monday evening, May 3d, '86, to their friends at the St. Louis Club. Distance and regret were our share.

"Hello, Brown," said a dentist to a fellow maker of four-dollar teeth who had just squatted in a puddle of water, "what are you doing there?"

"Makin' a cheap set, my frien'—cheap set."

Dr. Chas. F. Ives has devised a metal screw with wood-screw thread that cuts its way into the pulp chamber of a root without the help of a tap. It is designed as a substitute for pins, posts, etc., now commonly used with Howe, Bonwill, and other porcelain crowns.

Dr. W. J. Younger, of San Francisco, is being published abroad for his apparently successful attempts in fixing teeth in artificial sockets. A short time since there was a case of this kind in Rochester credited by a patient's friend to a dentist of St. Louis. We could guess his name and not half try.

Those who heard Prof. Roswell Park's remarks before the district societies at Buffalo last October, on a case of total extirpation of the larynx, may feel some interest in further details of both case and appliance, all of which may be found in the *Medical Press* for December, '85. The *M. P.* is published at Buffalo.

In the current number of the *Dental Cosmos*, Dr. C. N. Pierce returns to "Function," etc., read before the New York Odontological Society in November last. The essayist criticises, makes clear, and concludes in a way that makes it at least expedient for several gentlemen to talk back. The illustrations, by the way, are from the "American System of Dentistry," now in press and being canvassed for throughout the country.

BOOKS, PAMPHLETS, ETC.

CATALOGUE OF DENTAL INSTRUMENTS AND MATERIALS. Boston: Codman & Shurtleff. Pp. 227.

SOUVENIR. Annual Dinner of the New York Odontological Society, 1886. Rochester: Odontographic Journal. Pp. 33.

ANNUAL ADDRESS before the Massachusetts Dental Society, Boston, Mass., Dec. 10, '85, by Dr. D. B. Ingalls, of Clinton, Mass. Pp. 16.

CATALOGUE OF ARTIFICIAL TEETH, PRECIOUS METALS, ETC. A new edition considerably enlarged and containing descriptions and illustrations of the most recent inventions, improvements, etc., connected with the dental profession. London: Claudius Ash & Sons. 1886. Pp. 488.

SOUVENIR. Seventh Anniversary of the First District Dental Society of the State of New York, December 9th, 1885. Philadelphia: S. S. White Dental Manufacturing Co. Pp. 73.

A handsomely bound reprint of the proceedings had as above and as published in the *Dental Cosmos*.

THE

Odontographic Journal.

VOLUME VII.—*October, 1886.*—*No. 3.*

ACCURACY AS A CONDITION OF SCIENTIFIC PROGRESS

BY J. SMITH DODGE, JR., M. D., D. D. S., NEW YORK.

[Read before the Dental Society of the State of New York, May, 1879.]

A RETROSPECT.

The number of things which a practising dentist ought to know threatens to become overwhelming. Those who can remember the novelties introduced within the last twenty-five years will be equally astonished, on making the survey, that such a revolution could occur in such a time, and that any art could endure such a revolution and yet remain essentially the same. It is now about twenty-five years since the profession began to appreciate the cohesiveness of pure gold, and to use this quality in filling teeth. One of the first results was a demand for more perfect dryness than any previous means afforded, and the imperative demand produced that master-piece of invention, the rubber dam. But the rubber dam does not always choose to stay where it is put, and further invention easily produced the numberless brood of clamps and their adjuncts, until the problem of dryness was fully solved, and one of the greatest difficulties of careful filling absolutely abolished. From the first suggestion of cohesive filling, the more daring minds had conceived of operations never before imagined; and with each added facility the ideal grew more and more exacting. Of course, new tools were requisite to perform these new operations, and the burring-engine inevitably followed. But the engine, invented to do what had been previously conceived, presently enlarged, without limit, the conception of what might be done. It now became possible to do to a tooth, within practicable limits of time and labor, anything of a mechanical nature which the operator might desire ; and as the engine put the form and substance of the tooth wholly within the dentist's power, so the whole range of malleting inventions—from blows that would nail a box to the vibrations of the electric mallet—made it possible to give any conceivable bulk and shape to fillings.

Now, all this is a bare outline of only a single course among others along which dentistry has been developing. If one proceeds to fill in this outline with the infinite varieties of filling materials, hand instruments, office furniture and other appliances which group themselves naturally about these salient features, he will begin to grow bewildered. But when all this is done there remain at least two coördinate lines of progress not yet suggested and equally prolific. Quite as full a statement might be made of the evolution of mechanical dentistry which touches at so many points various industrial processes of general application. And again, on the other side of operative dentistry, spreads the vast field of anatomical, physiological and histological research, industriously cultivated through all these years, and fruitful of results which may, indeed, seem remote from our daily work, but which some new pathological condition may, at any moment, thrust imperatively before one's face as the one thing he needs now to know. But even when these three strands are twisted into a single conception, the whole is not stated. For this process of advance rolls forward with unceasing increase. Every capital discovery comes to us pregnant with an unimaginable brood of auxiliary novelties, and so far are our present attainments from completeness that each of them seems an open door into the future, and there is probably no one thing of which all dentists are so sure as that the progress of the dental art has only begun.

THE OUTLOOK.

If we sweep, then, with a comprehensive view, the entire field—past, present, and immediately to come—it will appear no exaggeration to repeat that "the number of things which a practising dentist ought to know threatens to become overwhelming." And the difficulty is the graver, because this advance goes on by a certain organic force of its own, developing new activity at most unexpected points, and remaining stagnant for long periods just where we most desire improvement.

No man can say or guess what theory of his will be exploded next week, nor what favorite method of practice may have to be dropped, and a new one learned instead. It is all we can do to hold our ground, and yet, at any moment, the bugle may sound an advance. For a conscientious man all this is no small perplexity, and he may well ask himself and his neighbors what must be done.

Fortunately, we are not the first among men to meet the same trouble, and the way of escape, while it is not easy, is well known. The growing intelligence of mankind, since the dawn of the twelfth century, and especially for the last four hundred years, has been beset by a swelling flood of individual facts in all departments of knowledge, and has had, in respect to the entire field of human observation and action, just that difficulty of retaining and using its acquisitions which now besets the narrower area of the dental profession. And mankind long ago found the solution of the problem which is called Science. The urgent need of dentistry at this day is, that it become, not so much a separate science, for it is too composite for that, but through and through, and in all its details, scientific. For science is like the fairy tent in the Eastern tale, which could be held at need in the palm of one's hand, and yet expanded in another moment to shelter an army. Science may, this morning, be focalized upon the slender margin of a proximal filling, and this afternoon formulate the universe.

WHAT IS SCIENCE?

Now, what is science? Many persons, who ought to know better, imagine that a man of science is one who knows more or less facts generally unknown, and can state strange theories about them; so that remoteness from the observations and conclusions of average life, becomes the central idea of science. How absurd this idea is need not be argued before this assembly; and yet even those who are doing honest scientific work do not always know what constitutes a valid claim to the honor of that name. Etymologically, science means, and has meant, these five and twenty centuries, *knowledge*. But, in the language of the nineteeth century, *science is the knowledge of things in their relations to each other*. And this recognition of the supreme importance of *relation* in the knowledge of facts is the distinctive mark of all science. The mechanic, the miner, the savage hunter, can teach the physicist, the geologist, and the naturalist, separate facts which the learned never knew. But to the empirical minds of the former each fact stands by itself—curious or useful, but alone; while the man of science immediately fits, or strives to fit, each separate fact into some gap where other facts had not seemed completely adjusted to each other; and the result is often like adding the keystone to the arch—it is only one stone more, but it makes efficient all the rest. Precisely the same consideration, turned the other way, corrects the pernicious fancy that the chief business of science is to spin theories, and mostly from a very slender staple. So untrue is this that the moment any man's theory goes a hair's breadth beyond known facts, science refuses to be responsible for the conception, and it becomes the individual hypothesis of the inventor, to stand or fall on his responsibility alone. What is actually done, when the wonder-working hand of science ennobles the meanest thing, and brings cosmos out of chaos, is to demonstrate the ascertained relations of ascertained facts, constituting an order which existed equally before it was suspected, and is wholly independent of human invention. There is no more perfect statement of the true meaning of scientific discovery than Kepler's, who, having at last verified the three laws of planetary motion, exclaimed, "O, God, I think thy thoughts after Thee!" And this idea, which is so sublime in its larger applications, abates nothing of its severity when it is applied to the smallest and most familiar things. In the contour of a bicuspid, as in the movements of the heavens, that, and that alone, is scientific which expresses the actual relation of actual facts.

It is by thus *sorting* our facts that science removes the vast difficulty of remembering or recalling the numberless integers of human knowledge. That fundamental law of memory, association of ideas, enables the mind to pass from point to point along and across the endless web, and, having what is before the eyes, to recall whatever of the kind has been previously seen. By this means alone, the human mind is capable of the knowledge it already possesses, and looks forward, without dismay, to the sure increase of the future. And it must be by this means alone that dentistry will keep at its free disposal all the past has yielded, and be glad to give hospitable welcome to all that is yet to come.

ACCURACY.

From this point one may diverge into many profitable trains of thought. It is the object of this paper to follow only one of them, by insisting upon that habit which is at the core of all scientific advance, and which, the writer makes bold to say, is to-day the one most strikingly deficient in the mental processes of dentists—accuracy. In this connection, accuracy means simply keeping close to the facts, whether they be facts of being or facts of relation; and all that has been said shows the supreme importance of that posture. The scientific knowledge of the universe is like a Waltham watch, a complicated fabric of many parts, each constructed by a different man in a different room. The parts being done, the watch is done, on the one condition that each part is exactly right. If this is so, all will go smoothly together and keep perfect time; but if any one workman has made his piece a trace larger or smaller than the gauge, the piece will not fit and the watch will not run. So if any man reports, under the name of science, a fact a hair's breadth wider or narrower than the gauge of exact truth, it will frustrate some other man's observation and throw the whole group to which it belongs into confusion. But it is the characteristic of truth, exact truth, that it "fits all around." So that a fact accurately reported a thousand years ago will tally exactly with its correlative fact discovered yesterday.

With these preliminary generalities let us now consider more in detail several ways in which our art demands more scientific accuracy than it has habitually found in its votaries. But here let me disclaim the attitude of one who passes judgment on the faults of others. The difficulty of maintaining always that accuracy which is the vital breath of science is so great, that no man need hesitate to own he has many times failed in the endeavor. Certainly the writer owns it freely, for the faults which are to be criticised are best known to him from the efforts he has made—not always with success—to avoid them

KNOW THYSELF.

The first demand for accuracy which the dentist is bound to recognize, relates to his own estimate of himself. When the Rev. Jasper stoutly asserts, "The sun do move," and preaches sermons to demonstrate that it is on the east side of the barn when it comes up and on the west side when it goes down, that dusky divine is beyond question perfectly honest, and his chain of evidence seems to him complete and unanswerable. His mistake simply is that he supposes himself fit to judge of things for which, in fact, he has no capacity. He neither knows the amply demonstrated facts which prove the rotation of the earth, nor has he the mental training necessary to understand the cogency of their meaning if the facts were laid before him. The difference is that most Americans are intelligent enough to know their own position in such matters, and do not presume to question the consenting testimony of all those who are competent to judge. To this modest and correct self-estimate Mr. Jasper is the exception. Now, among dentists the Jaspers are uncommonly many.

We are generally a self-satisfied and willful class, and each of us is apt to think he has seen all the human mouth has to show and is a little better qualified to judge of it than anybody else. While the fact is, as every educated man among us will confess, there are but few (besides himself) who can impartially observe, carefully generalize, verify by satisfactory experiment, and so add to the accurately ascertained science of our art. Perhaps this misconception was at first unavoidable. When the appeal was made to dentists to study their facts and lay a scientlfic basis for dentistry, it was natural the apostles of science should declare no man was fit to practice who was not a scientific man. And if this was the word, then multitudes of dentists who had honestly plodded along before and done much good, mixed with some unmeant harm to mankind, must decide whether to own themselves unfit for the work which fed them or to become "scientific." Of course they decided upon the latter. It was rather interesting and not too laborious to read a few books and remember the long words, to look over some plates and peep into a microscope now and then, and presently to select some one of those thousand fancies which swarm in all dentists' heads, and vent it decked with learned terms as a guarantee of scientific standing. The hands, indeed, seemed the hands of science, but the voice was the voice of Jasper.

The root of the whole mischief lies in one ambiguity. Dentistry is an art, and is striving to become a science. And every dentist is bound to sympathize with this endeavor, to keep himself informed of all progress that may be truly made in it, and, *if he be competent*, to help it on. But it does not at all follow that a man's practice is worthless and he a charlatan because he cannot give scientific account of what he does. There is many a man whom I would gladly have fill a proximal cavity in my molar, but for whose opinion upon the electro-chemical theory of decay I do not care a fig. And it would be infinitely more dignified and honest for such a man to listen quietly, doing what he has found good until something better is shown him, than to rush into speech or print with his crude and worthless opinions. They encumber the field and bring the discussion into contempt. But the munipulations of the dental art, honestly performed rccording to the operator's experience or that of his teacher, while they may be called old fashioned, will do service to his patient and win honor for himself, though he should declare himself continually a learner and not a teacher in science.

LEARNING AND TEACHING.

But supposing this selection to be somewhat fairly made, there remains much need to urge accuracy upon those who are qualified to push the car of *Science*. And for these the subject may be divided into two branches, accuracy in learning and accuracy in teaching; the former covering the process by which the investigator ascertains scientific truth—the mental endosmosis, and the latter that by which he conveys to other minds the knowledge he has acquired—the mental exosmosis.

The process of acquiring scientific knowledge at first hand, consists of three parts, the observation of facts in nature, the deduction of a generalization from a series of related facts, and the verifying of this generalization by suitably contrived experiments. The student of dental science has peculiar advantages in pursuing this process, because the successive steps are, in his field of observation, easily distinguished. Let us take each step in order.

Observation. It is one of the popular fallacies that nothing is easier than to see what is before one's eyes. But the fact is there is nothing more difficult. Hardly a suit is tried at law in which eyewitnesses of equal credibility do not contradict each other concerning simple facts. There is probably not a dentist in this assembly who could at this moment describe the conformation, tooth by tooth, of the full human denture, without making blunders which a dozen others would immediately detect. And yet each of the dozen in his turn would make other blunders equally great. It will be a wholesome lesson to any who may doubt this, to try the experiment of studying his watch-case or his penknife five minutes, and then attempting to write an accurate description. Now, it is just this *accurate* account which science needs. Give this, and it will fit any other observation or any continent. But the untrained mind imposes upon the mental impression which an object makes, such distortions as its prevailing habit of thought or its present mood or passion happens to dictate, and the untrue result passes into memory as an actual presentation of the object. But this is not scientific observation. On the contrary, it is necessary that the scientific observer be on his guard against these delusions; and even with long practice he will hardly acquire such a habit of seeing simply what is before his eyes as will relieve him of the duty of cross-examining his perceptions while the facts are still in sight.

It can hardly be necessary to insist much upon the statement that the annals of dental observation are vitiated most broadly by this unpardonable fault. How else are we to take those frequent marvels which are gravely related as common in this or that gentleman's practice, but which nobody else ever sees? It is impossible to imagine that dentists lie, but it is certain they squint terribly. Let me again repeat that the difficulty is enormous of eliminating from our simplest observation that which others have reported, that which we hoped to find, that which our dyspepsia or our weariness or our vanity suggests, and seeing merely that which we see. Let no man feel offended at the suggestion that he needs this purging of the eyes, or ashamed to confess that he finds it extremely hard to achieve. Accurate observation of separate facts is the corner-stone of science, and only master masons can lay it.

Generalization. The mind is constructed with an irrepressible tendency to generalize. Two facts can hardly be observed in succession without a perception of some likeness or unlikaness, and as the series extends the comparison grows into general ideas. In fact the mind does this work extensively and with much correctness without our conscious effort. Men who never deliberately deduced a principle from a series of facts, nevertheless have general ideas by which they guide their conduct and to a degree predict the future. Probably a close scrutiny would show that all minds necessarily depend much upon the results of such unconscious cerebration. But while the process is largely unconscious, it is still governed by those habits of mental action which we have full power to train and cultivate. He who takes care to think closely when he is purposely thinking, will find his mind has done its spontaneous work in an equally accurate manner. While he who permits his desire or his sloth to vitiate his deliberate thought, will find his mind slovenly and untrusty when it works of itself.

Now, by this process of generalizing, the mind, having observed a certain thing in a certain relation again and again, relieves itself of the burden of remembering each instance separately by formulating the whole—A implies B. A swelling under the gum and certain reports of pain make the dentist as sure of an alveolar abcess as if he had extracted the tooth and seen the sac. The first imply the second. And this process of distilling the active principle from a series of facts, is the precise and constant function of science. It is the knowledge of things in their relations. Here, therefore, is the utmost need of accuracy. But here, also, is the utmost danger. The process is so fascinating that it is especially hard to keep the mind in suspense when a few data tempt it to assume rest in a general statement. All sciences, from chemistry to theology, are loaded down with these hasty conclusions of former times. And a great part of the business of scientific thinkers at this day is to test anew accepted principles and eliminate venerable errors.

NIMBLE-MINDED DENTISTS.

Of course a set of men so nimble-minded as dentists, have not been backward in this charming pursuit. No part of our history, and least of all the present, has lacked abundant instances of inaccurate generalization. Sometimes the error has lain in the faulty observation of facts, so that one may say the theory would be correct if the facts were only as they have been understood. But this goes back to the first step in the process of scientific investigation ; and of that enough has been said. The inaccuracy peculiar to the process of generalizing is the deduction of general statements from too few observations. If some dentist to the Bourbon family should declare the protruding lower jaw a normal conformation, because many of his best patients had it, he would be settling the standard of fourteen hundred million people from a dozen observations ; but he would be little more hasty or inaccurate than many dental theorizers have been. Three faulty deductions current in three epochs of dental practice will make clear the nature of this error and the need of making sure the basis of our general statements.

Long ago this maxim was somewhat current, "A tooth which has ached cannot be saved." We smile at that now, and probably it was never held in its full meaning. But it was honestly meant as the summary of many fruitless attempts to manage exposed and inflamed pulps, mostly ending in disaster. The disappointed dentist might naturally conclude to ignore the rare exceptions and extract aching teeth. The error obviously lay in assuming that the limited resources of that day covered the whole possible ground ; and the vice of this assumption readily appears if we consider on the one hand the very narrow limits of dental manipulation and dental medicine at the time, and on the other the large results which have gradually come from disbelieving this rule and trying for better ways.

Far more recently another maxim has had many advocates : "Any tooth that is worth filling can be saved with gold." If the New Departure has done nothing else, I fancy it has killed that idea. But most dentists who have had experience enough to know the value of a tooth, have been gradually coming of late years to care less what a tooth is filled with and more for the result. To my mind it seems clear that these worshipers of gold really meant, if they had said their exact meaning, that no tooth is worth filling which gold will not save. Their error, therefore, lay in excluding from their view all teeth but a single group, and from the latter drawing a principle for universal application. Many a well eaten dinner to-day will give, against their narrowness, the testimony of despised but useful grinders which gold could not have saved.

THE NEW DEPARTURE.

My third instance of hasty generalization is as novel and noisy as a new-born babe. It is the first article in the creed of the New Departure: "In proportion as teeth need saving, gold is the worst material." Since this startling law was announced I fancy many hundred dentists, as they made the customary examination of mouths long under their charge, have wondered on what evidence the statement rests, and pondered over those mystic vials in Philadelphia. I remember a central upper incisor which split from side to side, throwing off the entire face from the grove on the cutting edge to a point far under the gum, and laying open the empty pulp-chamber. The mouth was well filled with good teeth, and it seemed as if the need of saving that tooth was of the largest proportion. It was nothing wonderful to replace the lost half with gold, nor was I surprised to find it lately in perfect condition, after six years' service; but considering the great need this tooth had of filling, I was puzzled to understand why gold was the worst material that could have been used. And we should stay here a week if every dentist present gave the many cases of equal plainness which he can recall. Confronted with these every-day facts, the Departing brethren would doubtless say they did not mean these, and on cross-examination it might probably come out that their minds were chiefly fixed on the *cervical* borders of proximal fillings in bicuspids and molars. To which injured and hindered Science would reproachfully answer, "Then why did you not say so?" It can hardly be doubted that the daily experience of the profession will soon make plain that this latest novelty in generalization is the fruit of minds which have so much concentrated their gaze on certain facts, as to forget all others and make the part equal to the whole. It may seem that too much space has been given to this topic. But no space can be too great if it impresses upon our minds the exceeding difficulty and importance of accuracy in drawing general ideas from individual observations. And I will take the liberty of suggesting to our teachers that they should *incubate* long and patiently over their facts before they presume to announce what manner of fowl they have hatched. Meanwhile, nothing will be more useful or more scientific than a constant familiarity with certain qualifying words and phrases: "Probably," "In my opinion," "So far as is known."

Verification by experiment, is the final step. And here the branch of operative dentistry has all the advantages of an applied science dealing with familiar things. When Columbus had inferred the rotundity of the earth, it took him many years of toil and delay before he could try the experiment of sailing westward. When Ericsson had deduced the idea of the screw propeller, it required governmental aid, which was not easily obtained, to test the invention on a satisfactory scale. But when the operative dentist has slowly worked out a new idea relating to his art, he may confidently expect within a week or two the chance of putting it to the test. Every trial of a new material or a new instrument, every new shaping of a tooth or a cavity, every new medicine laid on a pulp or injected into an abcess, is, in the best and scientific sense of the word, an experiment, provided only it be made not at hap-hazard, but with a definite theory to test, and an intelligent choice of cases. Add to these the experiments of the laboratory, which are so happily becoming frequent among us, and the observations of the microscope and the scalpel, and it cannot be said that dentists are neglecting this crowning portion of scientific research.

But it must be said that while much of this is done daily, and while dentistry is making much sure progress by these means, still we are beset by theorizers so ignorant of scientific methods that they suppose the whole process to be complete when they have looked at facts and spun from them a more or less careful theory. Then the noise begins, and the wonderful discoveries are announced which startle us to-day and amuse us to-morrow. Let us all remember that science holds to facts at both ends. Her work begins with observing them as nature presents them, and ends with submitting to their inexorable decision under experiment whatever she has inferred. So that there is not and there never can be a single theory or general statement of anything in the universe which is a part of true science, except those which have been fully verified by the test of experiment. All besides is opinion or conjecture, more or less useful and often the best we can attain for the present, but wanting something still to make it scientific truth. But he who has patiently gone through this process, has accurately observed, accurately generalized and accurately verified, has enlarged the boundaries of human knowledge, and has claim to the respect and honor of mankind, whether the object of his research be the axis-cylinder of nerves or the order of the heavens.

KNOWING AND TELLING.

It remains to consider the converse process of making known to others that truth which has been gained in this laborious way. The two faculties do not necessarily go together. Because a man has learned, it does not follow that he can teach. On the contrary, the writer has known a maker of artificial dentures whose skill in all the details of constructing and adapting his work was simply marvelous, the admiration of all beholders. In his laboratory every tool was exactly right, and every process strictly methodical, while his results were always of the highest quality. And yet this man was wholly unable to describe his methods. In the attempt he would omit essential details, and at last break down in failure, saying, "I can show you, but I cannot tell." Now, the interests of science require that such a man should be silent. It is no impeachment of his one excellence that he has not a certain other excellence ; but it is a grave fault if because he can *do* he therefore claims an undeserved privilege of *saying*. His words will be inaccurate, and his half-told truth will have the effect of a lie. But what a few do from a fault of natural capacity, many do from negligence. Part of a process is told with the unconscious assumption that the hearer will supply what is not told, whereas, the hearer has no hint that anything is left to be supplied. Cases are stated without mention of surrounding conditions, although these conditions are essential to a just conclusion. But there is no need to multiply applications. It is among the commonest experiences of those who look into new dental discoveries or methods, that when they see the *thing* the first glance shows some essential deficiency in the description. "You didn't mention that," says the spectator. "Why, I thought anybody would understand that, of course," answers the would-be teacher. A notable instance of this is recorded in the published minutes of this body for a year not very remote. A gentleman read a paper describing his method of treating exposed pulps. He was understood to claim that by this method he saved almost a hundred per cent. of all cases which came to him. Such a claim, of course, called forth a brisk fire of cross-examination, which at least drew out the fact that the writer only attempted to treat such cases as he judged would do well, and *of these* he saved the large percentage named. So that the gentleman's paper demonstrated, not the success of his method, but the shrewdness of his judgment. These and a hundred other instances present the common characteristic of a confused mental conception as the cause of inaccurate teaching; and the remedy is to be found in mental discipline.

OUR VOCABULARY.

But there is a second cause which obscures our literature, and which is less excusable. Some of our instructors who seem to know well enough what they want to say, fill their teachings with unusual or even unknown words. Having constructed a theory to express, they next construct a language to express it in; forgetting, however, to furnish the hearer a dictionary of the new tongue. It is of course true that the necessities of *science* call for many new words, partly because new things are to be named, and partly because an accuracy of expression is needed, which is not easily attained with common words. But much of this is already done, and the results are at our service, so that it is a positive fault to distort the statement of important facts by the use of obscure and uncouth substitutes for accepted words. If the gentlemen who find themselves subject to this temptation would study the dictionary, they would probably be surprised to find how amply the English language is already provided for all occasions, and their hearers would certainly be delighted at finding themselves able to understand every word the teachers say.

Finally, to sum up this extended paper in few words, we dentists are confronted with a multitude of things already known and another multitude, which no man can number, of things pressing to discovery. The only possibility of having all these at our command lies in knowing them *in their relations*, which is science. And the fundamental requirement for obtaining such scientific possession is *accuracy*,—accuracy of eye and touch, accuracy of perception and memory, accuracy of comparison and induction, accuracy of test and accuracy of speech, in a word such accuracy of the whole observing man as may be worthy to set itself beside that infinite accuracy of fact which we call the Laws of Nature.

COMMON SENSE, A MOST VALUABLE FACTOR IN DENTAL PRACTICE.

BY C. A. MARVIN, D. D. S., BROOKLYN, N. Y.

[Read before the Dental Society of the State of New York.]

Well, who denies the proposition?

No one, in words. And yet the extremely fanciful and excessively scientific character of much of the dental literature and more of the dental discussion of the day, would almost justify the criticism that dentistry is in danger of dragging its anchor and drifting away into unknown and unsafe waters.

And if the practice conforms to the teachings, there is great danger.

Now, common sense is no enemy to science, but it is a break upon reckless dash, a clog upon airy flights. It is a testing principle of new theories, one of the implements by which "good work, square work" is tried, previous to its acceptance. It is a valuable commodity to possess, and he who holds it in active exercise and is guided by its verdict, is an acquisition of no small weight to any community, to any society, to any field of endeavor.

Is it, then, an uncommon possession? No; but it is so unobtrusive, so free from pretentious dash and glitter, as to be easily overlooked, easily eclipsed by the flash of meteoric genius. In its quiet repose it is not so attractive, does not seem so valuable as pretentious, polysyllabic-tongued science.

Is not science valuable, then?

Certainly; most valuable. That is, the real article is valuable, but the imitation, though overlaid with scientific terms, is worthless.

Is not science justified in speaking in its own special language?

Truly so. Every department of knowledge has its own special nomenclature and forms of utterance, and is entitled to employ them when announcing its truths. But it is necessary that there be truths behind the terms, else these are vain and offensive.

Is science to be ignored in dental practice? Oh, no. It lies at the foundation of all correct practice, attends it through all its continuance, ensures and crowns its success.

And now, bringing this cross-examination to an end, I will, if the court—the State Society—please, endeavor to set forth, as concisely as I am able, the views I entertain on this subject, within the field and in the direction outlined in the catechism just rehearsed.

And first, definitions are in order.

What do we mean by common sense?

Common sense is that innate faculty which perceives the natural fitness of things, judges of objects in their true character, irrespective of garb or connection, and takes note of the natural result of related things.

Common sense is not the product of education, although if allowed its sway during the process of education, it will be found strengthened and increasedly reliable. It then becomes enlightened common sense. This faculty is always an ally of clearness of perception, hence always urges clearness of statement.

It abhors obscurity as Nature is said "to abhor a vacuum." Hence in its natural character, it is honest. It regards words as merely vehicles of ideas, and esteems the ideas as far more valuable than the vehicle which conveys them. The easiest, shortest and surest mode of transmitting an idea is the most acceptable to common sense. And for two reasons: First, the quicker possession of the idea, and second, the smaller quantity of distracting accompaniments. Elegance of diction appeals to another quality of the mind, which is the fruit of culture, viz., intellectual taste. And while the taste is being richly regaled with choice language and sonorous phrases, often to its utter forgetfulness of their proper employment, common sense sits, like an imperturbable judge, watching and counting the grains of golden thought discoverable amid the mass of glittering verbiage, which to it appears as so much tinsel.

If one method of reaching a desired end is more direct than another, though it be a lowly one, common sense chooses it at once. It will not, if left to itself, select that other because more lofty. Another trait—pride—may urge it, may succeed in forcing it, and common sense may be overruled, but it finds its only satisfaction in seeing the end reached, and that satisfaction is diminished just in proportion as the means employed or the way selected, however lofty or lustrous, shall delay the attainment of that end.

Not that there is any virtue in choosing a lowly instead of a lofty way, if both are equally direct and safe; and common sense would undoubtedly concur in the selection of the latter, provided the other conditions, viz., directness and safety, were present.

Common sense looks to the building up of reputation by merit, and judges that a more lasting name will be born of success in achievement than of brilliance in method.

If such be the nature and operation of the faculty we call common sense,—so named because in some degree it belongs to all people,—it will be seen that its cultivation and influence, in every department of human responsibility, are most desirable. Particularly is this so in complex avocations, and in the consideration of questions where there are many and diverse opinions. The science and practice of dentistry belonging notably to the category of complex avocations, the faculty of common sense finds an appropriate and abundant sphere for its exercise in the field of our professional study and practice. The term "science" and the formulas, and processes and reasonings created and set in operation by it, though they possess an intrinsic value and are worthy of interest, do still charm *many* by their mystery or novelty or logic, and fail to elicit that response which indicates an intelligent perception of the *object* and *end* of such processes. This is not the fault of science. She cannot supply both the demonstration and the ability to perceive it. She cannot prevent men from being diverted from the end by the charm of the means.

But it is vain to deny and equally unwise to ignore the fact that there is much that is called science in the world which is not science,—much that assumes its garb, copies its modes of expression, and simulates its processes of reasoning, and bears the same relation to true science as the base metal, though of legal size, color and stamp, does to the true, genuine coin. And people are deceived by it, when they ought to be able to detect it. This is because superficial qualities attract and hold the attention so that the absence of real worth is unnoticed.

The observation of this admiration for exterior qualities, so widely prevalent, naturally leads to the habit of cultivating them on the part of those who speak or write for public favor, and resultantly, to a permanent inability to distinguish the specious from the genuine, and a gradual absorption of regard for the matter to be presented, by concern for the grace and beauty of the modes of its presentation.

The ideas thus far advanced, while applicable to every sphere of thought and skilled labor,—literary, scientific, manual,—bear peculiarly appropriate relation to the theory and practice of dentistry.

Let us analyze for our use in the further and special consideration of our subject, the probable dicta of the oracle, should we apply for instruction from our Jove-Common Sense.

1st. Call things by their right names.

2d. Have an idea when you speak or write.

3d. Express that idea in the shortest and clearest manner.

4th. Never lose sight of the idea till it is expressed.

5th. Have an end in view when you practice.

6th. Be able to state it if asked.

7th. Have a reason for every method you employ.

8th. Let that reason be one that your intelligent patient can comprehend.

9th. Pursue no circuitous modes of practice unless none direct will meet the case.

10th. In your investigations, keep before your mind some practical end to be better attained in consequence of your study.

Unless our oracle is a false one, here are several useful directions for dentists. And that it is not false, or at least that the directions are not false, many whose hair has grown white in the practice of dentistry, can testify.

Of course, all the questions suggested in these ten rules cannot be considered in a single paper, but enough can be selected here and there, to establish the proposition contained in the title, not only, but also the propriety of asking the attention of the society to this subject.

The habit of employing high sounding terms is very seductive and very contagious. It is not necessarily an evidence of scientific attainment nor of great thoughtfulness, and unless indispensable to the clear presentation of an idea, it is not wisdom nor good taste. An intelligent patient can easily distinguish between the necessary and useless employment of scientific terms. And while the former may be confusing, it is still accepted, while the latter is offensive.

One part, and no insignificant part either, of a dentist's mission is to instruct the people with whom he may come in contact. And this for various reasons. That they may realize the importance of caring for their teeth ; that they may value dental services ; that they may be able to discriminate between skillful and unskillful treatment. Such a result will inure to the benefit of the profession, by raising its standard to meet the higher demands upon it which such knowledge shall make.

Now, in order to secure so desirable an end, it is requisite that the people, to whom dentists talk, shall understand what they say. This is common sense. It follows, then, that there must be, in the spirit of our oracle, ideas behind the words, words which clearly express those ideas, words which are within the understanding of the listener. "Call things by their right names," but use such names as are intelligible to the unprofessional mind. If this cannot be done, let the necessary names be explained, currently with their employment.

This is common sense again. The satisfaction resulting from such instruction, and such a mode of communicating the instruction, is two fold. The expression of countenance betrays the satisfaction which the enlightened patient experiences, and the dentist feels a glow of pleasure within his own breast as he perceives the result of his efforts.

Besides this satisfaction, the dentist realizes a spur to study, that he may carry on his patient-pupil further in the field of knowledge and always be able to lead and explain the way.

"Never lose sight of your idea till it is expressed." A needful rule, in these days when the attractive force of side issues is so great. To conduct a course of reasoning on the principle of stating each successive idea, as it is formed in the mind, clearly, yielding to no temptation to wander from it till it is plainly set forth and plainly perceived, is the highest type of legitimate argumentation, and is a great attainment.

In pursuing a line of thought, new and lateral ideas are continually presenting themselves to the mind of the speaker, and it is no easy matter to avoid turning away from the main track in these side directions. This is not consistent, if the chief idea—the point under consideration—suffers thereby by reason of interrupted support. It is to be plainly set forth and when stated, such of these lateral ideas as are pertinent, may be adduced in their turn, to illustrate, maintain, defend or explain it, as their nature shall determine.

The same principle applies in conversation at the dental chair, as in the assembly of experienced practitioners, or the college lecture room crowded with students ; in the private direction to a patient as in the formal, written thesis for a society.

When attempting to impart an important idea to a patient, neither difficulty of framing it, its own elusive character, nor obtuseness of perception in the hearer should be allowed so to distract our thoughts that the idea shall escape us. We should follow it as the sleuth hound its game, nor once be thrown off the scent.

These thoughts apply also to the practice of dentistry as well as to the discussion of theories or the statement of principles, for all are closely allied and have, or should have, a common origin and a common end.

Leaving the application till another and necessary division of our subject is briefly considered, we will enter upon it at once. Much has been said of science, and it is entitled to its consideration just here.

Science, from the latin word, *Scio, to know*, means known facts that have been proved or are capable of proof by logical reasoning or practical experiment, or both.

When the premises are true, the reasoning correct, the experiments honest and thorough, the conclusions are valuable and worthy of acceptance. Against such results there can lie no valid objections, and the mind that refuses to accord them credence, must either lack the ability to appreciate convincing proof or be preoccupied by prejudice.

Such science maintains no antagonism with common sense. Instead of this, it satisfies it, which is a mighty evidence of its genuineness. But, as reliable results are wholly dependent on the conjoint presence of the three conditions before named, viz., true premises, correct and logical reasoning, honest and thorough experiment, and are not reliable if any of these conditions are wanting, it will be seen that the danger of mistake is very great, the declared results very liable to be erroneous and misleading. Here an enlightened common sense is of vast advantage, and its verdict, quickly rendered, as all its verdicts are, should command our respect and be deemed largely authoritative.

There is a fascination in working out what are termed scientific conclusions, and a great tenacity, on the part of the professed scientist, as to their accuracy. His theories are proclaimed with a positiveness that captivates some, who admire boldness in statement, and awes others, who are timid and modest in their expression of views. And oftentimes, even when common sense has entered its protest, its voice is unheeded, and the bold dictum is accepted as revealed truth and made a governing principle of future action.

Now, it is not the design nor spirit of this paper either to discourage scientific investigation or discredit the fruits of such investigation ; neither to rebuke the confidence of investigators or thinkers, nor encourage the rejection of their conclusions, but by a candid presentation of fundamental principles, to show how truth is to be found and how enen imminent error is to be avoided.

In endeavoring to accomplish this, a test has been suggested, not a new creation by any means, but merely the direction of attention to one already existent, very safe, applicable everywhere and always, and one in every person's possession, viz., common sense.

Now, if the line of reasoning carried thus far has been followed, it will not be difficult to perceive its practical bearing and its value to dentists as practical men.

1. "Have an end in view when you practice."
2. "Be able to state it if asked."
3. "Reach it by the shortest route."

We read these among the utterances of our imaginary oracle, and surely no deliverance from classic Delphos was ever more true or more useful.

The field here opened is vast, for it is virtually the entire field of dentistry. We shall cull here and there, a few prominent ideas with which to point our lesson.

Random dental practice is discountenanced by the rule we are considering. To grasp a carious tooth with one hand and commence vigorously to cut it with the other, with no well formed idea of shape and size, is to work without a purpose, at random. Possibly a fair result may be reached, probably not. Such an operator would be put to the blush if asked at the outset of his attack upon the tooth, how he intended to shape his cavity, how anchor his filling, how much of the tooth structure he should remove, and he would probably manifest his discomposure by an exhibition of irritation at the questions.

Such a method of procedure wastes time. To cut and file and drill, until by and by a plan dawns upon his mind while cutting and filing and drilling, is oftentimes to expend time and labor uselessly, for the plan finally conceived, perhaps did not require just that cutting and filing and drilling, but some other, which yet has to be done.

How much more common-sensible to look at the case and form a plan of operation first, then work directly towards its execution. How satisfying to one's self, how instructive to the student, how pleasing to the friend looking on, how creditable to the profession, such a practice is.

If a case of disease in the oral cavity presents itself, and the dentist seizes and applies one after another of the remedies upon his shelf, in the hope that he may happen upon one that will afford relief, what a pitiable spectacle of professional incompetency is displayed. He may employ an agent that will greatly increase the irritation, and be obliged to undo his own work, before making another leap in the dark. So again time is wasted. So, perhaps, permanent injury is done. So, certainly, unnecessary suffering, or an unnecessary prolongation of suffering is caused his patient.

Does not every one see at once how unwise this is? Or, again, to employ a method or means suggested by another, without understanding the details of that method, or the operation of the means, is not in accord with common sense, nor is it at all certain to be followed by favorable results. It *may* be, for the circumstances may all conspire to produce that result. But it may *not* be, and is quite likely not to be, because circumstances vary, and their variance necessitates a corresponding variation in treatment, which he who imitates, without understanding, is not able to pursue. He is, therefore, all at sea, and casts about in dismay, and vainly, for some way of escape. It needs no serious thought nor great amount of culture to enable a man to pronounce upon the folly of such a system of practice. His common sense decides upon it instantly. And the same faculty in the dentist, if allowed its sway, would have forbidden his adoption of such a course. "You'd better know what you are doing, and how to do what you want to," would be its homely advice. And the most refined intellect and best stored mind could give no better, although it might be couched in more polished terms.

In all the departments of dental practice, without an exception, the exercise of an enlightened common sense is a great safeguard, and no one should work disregardfully of it, nor in opposition to its voice.

It is the "governor" of the engine, regulating its motion; not generating the power, not obstructing its application, but a *regulating* influence, equally opposed to rash haste and thoughtless indolence.

In the various divisions of the mechanical department of our profession, grave errors may be made, unskillful results reached, much derision of dental claims excited, by taking no heed to the suggestions of this faculty. On the contrary, great satisfaction will follow its exercise, and the power grow stronger by use.

But it may be said, there are regions of thought so sublime, depths of research so profound, details of operation so intricate that a common mental faculty cannot appreciate them, that nothing but a mind trained in scientific knowledge is capable of grasping them. Let it be remembered always that the faculty of common sense is ever faithful to all its sister faculties. It is always ready to accompany them, to note the culture they receive and the progress they make. It too, in this way, becomes more fit to perform its peculiar function. And unless one peremptorily dismisses this faithful friend or hushes its voice, the process of cultivation which is assumed to take the mental powers far out of the range of so homely a faculty, is affected all through its course, by its shaping influence. The result is a well balanced mind, capable of understanding deep things and coming to wise conclusions.

And that is the style of mind a dentist should possess. Such is the mental discipline through which a dentist should pass. Scientific knowledge is valuable. One cannot have to much of it. An understanding of the elements and relations of the component parts of bodies is valuable. One cannot know it too well. The ability to set forth in proper language well constructed theories, and to announce right principles is a valuable attainment. One cannot be too well qualified in this regard. The ability to diognose, to treat, to manipulate, to preserve organs, to restore expression, to supply lost power, is a great possession. But underlying all, pervading all, imbuing and governing all, in the safest and best mind, is the quiet, watchful, trustworthy faculty—an *Enlightened Common Sense.*

PROCEEDINGS OF THE DENTAL SOCIETY OF THE STATE OF NEW YORK.

EIGHTEENTH ANNUAL MEETING.

Assembly Parlors,
Albany, May 12th, 1886.

FIRST DAY—MORNING SESSION.

The Society met as above, and was called to order at ten o'clock by the President, Dr. Frank B. Darby, of Elmira, who requested Dr.

W. H. Atkinson to invoke the divine blessing upon the Society and the work it was about to engage in.

The following permanent members responded to their names publicly, or later at the Secretary's desk: Drs. F. LeGrand Ames, W. H. Atkinson, E. C. Baxter, Wm. Carr, W. H. Colgrove, Frank B. Darby, M. E. Elmendorf, Frank French, S. D. French, C. W. Harreys, O. E. Hill, A. M. Holmes, Myron D. Jewell, J. Edw. Line, C. Merritt, Jas. J. Mills, H. G. Mirick, B. C. Nash, F. D. Nellis, S. B. Palmer, John J. Pitts, A. N. Priest, J. H. Race, C. F. Rich, P. Sloan, A. P. Southwick, C. K. Van Vleck, C. F. Wheeler, C. A. Woodward, Albert M. Wright.

Also the following delegates: P. S. Garvey, E. D. Downs, W. C. Stewart, W. W. Walker, G. W. Hoysradt, R. I. Verplanck, H. L. Whitbeck, H. G. Nelson, F. T. Van Woert, W. A. Campbell, E. H. Dickey, M. C. Gottschaldt, C. S. Butler, Geo. W. Melotte, G. H. Butler, B. G. Saunders, M. H. Smith, Alfred R. Starr, F. G. Tibbitts, F. A. Greene, C. C. Smith, S. P. Welch, F. Schermerhorn, E. L. Swartwout, J. H. Holly, C. F. Booth, A. C. Rich, O. J. Gross, F. E. Howard, E. P. Brown, C. F. Ives.

The Secretary, Dr. J. Edw. Line, then read the minutes of the last annual meeting, which were approved as read.

The Committee of Arrangements reported through its chairman:

Your committee would respectfully report that, through the courtesy of the Hon. Norton Chase, a resolution was introduced, and passed the Assembly, giving us the use of the Assembly Parlor for our meeting.

Also that a parlor was engaged at the Delavan House for the use of the Board of Censors.

We trust that the absence of the portraits of Drs. B. T. Whitney and Amos Westcott will be overlooked, as circumstances beyond our control rendered it difficult for us to produce them.

The following delegates from district societies have presented their certificates:

First District—Alfred Russell Starr, M. D., D. D. S.; Martin C. Gottschaldt, D. D. S.

Second District—Dr. W. A. Campbell, Dr. Frank T. Van Woert.

Third District—Dr. Horace G. Nelson, Dr. P. J. Verplanck, H. L. Whitbeck, D. D. S.

Fifth District—George H. Butler, D. D. S., Dr. C. Cutler Smith, Dr. Frank G. Tibbitts.

Sixth District—Dr. George W. Melotte, Frank B. Darby, D. D. S.

Seventh District—B. G. Saunders, D. D. S., Dr. F. A. Greene, Dr. M. H. Smith.

Eighth District—Chas. S. Butler, D. D. S.

Edwin C. Baxter,
S. D. French,
A. C. Rich,
Com. of Arrangements.

The Committee on Business then reported as follows:

Your Committee on Business would respectfully report that it has engaged the services of Wm. R. Lansing, as stenographer, at an expense of $68.50.

A supplementary report will be presented at the close of each session, giving the programme for the session following.

The committee would suggest the conferring of the degrees immediately after the report of the Board of Censors is received.

M. E. Elmendorf,
E. D. Downs,
J. J. Pitts.

The President then read his Annual Address (See page 67).

The Treasurer, Dr. H. G. Mirick, presented the following:

To the Dental Society of the State of New York:

The Treasurer would respectfully present the following as his financial report for the year ending May 11th, 1886:

RECEIPTS,

Balance as per last report	$1,000 43	
Annual dues from District Societies	168 00	
Annual dues from permanent members	177 00	
Annual dues from New York College of Dentistry	6 00	
Admission fees from permanent members	40 00	
Diplomas	60 00	
Whitney Memorial Prize Fund	35 00	
Interest from Savings Bank to Jan. 1, 1886	36 80	
		$1,523 23

EXPENDITURES.

1885.		
May 13—Post-Express Printing Co., printing transactions 1884	$ 88 25	
" " Wm. Carr, per resolution of Society	100 00	
" " J. Edw. Line, secretary's bill	36 50	
" " J. Edw. Line, per resolution of Society	100 00	
" " F. J. Hillsbrandt, janitor Geological Hall	15 00	
" " F. J. Hillsbrandt, use of tables	1 25	
" " Committee of Arrangements	2 50	
" 14—H. G. Mirick, treasurer's bill	3 10	
" " Wm. H. Atkinson, prize essay	35 00	
" " Wm. R. Lansing, stenographer	64 00	
1886.		
March 3—Post-Express Printing Co., printing transactions 1885	98 50	
		$ 544 10
Balance on hand		$ 979 13

Brooklyn, May 11, 1886.

H. G. Mirick, Treasurer.

The Treasurer also presented the following supplementary report:

As an appendix to the Treasurer's financial report, it might not be considered inconsistant for me to inform the Society as to debts that are due it, as well as to its receipts and expenses.

It probably appears to those members who attend regularly our meetings and pay their dues promptly, that the office of Treasurer is a sinecure, and that its possessor has little work to do for all the honor it carries with it. For the three years that I have held the office, I have sent a bill soon after the annual meeting to all who had not paid at that meeting, and another during the same year a month or two before the next meeting. Some members never come to the meetings and take no notice of bills sent to them, and still their names appear in the list of permanent members of the Society. And as long as they remain on the books of the Treasurer he is bound to send them bills at an expense to the Society. And it seems hardly right that such delinquents should, after a suitable time, retain their membership without a satisfactory explanation, and I trust some action will be taken by the Society at this meeting.

At the present time those in arrears to the Society are as follows, viz.: (See RECORDS, page .)

Bills have been sent in all these cases at least twice during the last year, in most of which no notice has been taken. In one case the last envelope sent was returned unopened, with the short and suggestive word "skipped" written upon, evidently by the postmaster.

I have received the following letter from W. S. Elliott, formerly of Goshen, which will explain itself: (See RECORDS, page .)

Dr. Niles, Treasurer of the Fourth District Society, writes that that Society has not at present the funds to meet its dues, but that some action will be taken at the next meeting in August.

I have given these facts to the Society, and recommend that some action be taken whereby your Treasurer may be advised what action to take in the case of those who apparently rank as permanent members, but pay no dues to the Society for its support.

Also whether a member moving out of the State of New York ceases to become a member without action of the Society. Respectfully submitted,

H. G. MIRICK, Treas.

Dr. O. E. Hill moved to refer both reports to the Committee on By-Laws. Carried.

Dr. Hill then moved that the name of Dr. W. S. Elliott be dropped from the roll and his dues remitted, he not now being a resident of this State. Carried.

Dr. Hill also moved that Dr. Elliott be made a corresponding member. Carried.

On motion of the same, all members in arrears four years to the Society were stricken from the roll.

Dr. Mirick stated that that would include Drs. C. W. Harvey, Buffalo; W. F. Winne, Albany; and O. R. Young, Troy.

Dr. C. F. Wheeler moved that the name of L. E. Ireland be stricken from the roll for non-payment of dues. Carried.

The Board of Censors reported the following:

Albany, N. Y., May 12th, 1886.

The Board of Censors reports that the regular annual meeting for examination of candidates, was held at the Delavan House, Albany, on Tuesday, May 11th, 1886, beginning at 10 A. M. and continuing during the day. Censors present—Drs. Carr, Jarvie, S. D. French, Colgrove, Holmes, Palmer, Southwick and F. French.

Eight candidates were examined; three passed successfully, and are recommended to the Society for the degree, viz.: John H. Trull, 270 Fulton Street, Brooklyn; Joseph Luck Appleton, 89 Columbia Street, Albany; William Nelson Frazer, Danbury, Ct.

A letter has been received by the Board from the Indiana Dental College, asking for recognition by this Society, and it is recommended that a committee be appointed to investigate and report.

Two Censors are to be elected this year in place of Drs. A. P. Southwick and A. M. Holmes, whose terms expire with this meeting.

Frank French, Secretary.

Dr. French then read the following letter, addressed to the Secretary of the Society:

Dear Sir:—Not knowing to whom I should apply, I presume to address you as being Secretary of the Dental Society of the State of New York. It is the desire of the Indiana Dental College trustees that the Board of Dental Examiners of the State of New York shall recognize said College as reputable and honor its diplomas accordingly. The requirements for admission and graduation are the same for the Indiana Dental College as those of the New York College of Dentistry. Preliminary examination in English branches required. The diplomas of the Indiana Dental College are received in every State where presented, except in New York. Will you be so kind as to bring this application before the proper body or committee. By so doing you will greatly oblige the Board of Trustees, and your obedient servant,

J. E. Cravens, Secretary.

Dr. Hill moved that the letter be referred to the Board of Censors and that the Board report to this Society. Carried.

The Committee on Ethics reported through its Chairman, Dr. O. E. Hill:

The Dental Society of the State of New York is in perfect harmony with itself and the whole human race.

Ordered received and filed.

The Committee on Publication reported the following:

The Committee on Publication would report the printing, and distribution through the several district secretaries, of the Transactions for '85.

Six hundred copies, for the most part reprints of the ODONTOGRAPHIC JOURNAL, were run off, the expense being $98.50.

The cuts were loaned for purposes of illustration by the *Independent Practitioner.*

Signed, { J. EDW. LINE.
FRANK FRENCH.

Received and filed.

The President appointed Dr. W. W. Walker to serve as a member of the Commitsee on By-laws in place of Dr. B. Rathbun, absent.

The Committee on Dental Law reported as follows:

Since our last annual meeting, fifteen cases of illegal practice have been reported for investigation to your "Committee on Dental Law," with the following results:

June, 1885.—Attention was directed to H. J. Taft, of Far Rockaway. Upon investigation it was found that he had practiced prior to June 20, 1879, and was registered.

July 6, 1885.—Charges were made against James M. Burke of Buffalo. The Chairman of your Committee called upon him at his office shortly after, and made inquiries concerning his practice. He stated that he was operating for a salary, that the office was controlled by G. E. Hall, and that he, personally, had no pecuniary interest in it other than to draw his salary. He also said that he intended to enter a Dental College in the autumn. As nothing further has been heard of or from him, it is supposed that he entered college.

August 12, 1885.—The attention of the Committee was again called to Chas. Stanley, of Waterloo, who, upon being closely pressed last year ceased to practice, and came before the State Board of Censors for examination. He failed to pass. Immediately after his return from Albany, C. T. Vanderlip, of Waverly, opened an office in Waterloo and employed Stanley as an assistant.

August 20, 1885.—A charge of illegal practice was made against C. S. Thomas, of Hartford, N. Y. The complainant stated that Thomas came from Vermont and was not entitled to practice in this State. Investigation showed that he had practiced here prior to June 20, 1879, and had registered in the County Clerk's office July 8, 1879.

September 4, 1885.—Attention was directed to Charles E. Foote, of Northville. It was found that he practiced as an assistant previous to June 20, 1879, and continued in that capacity until 1881. In 1882 he opened an office for himself. He had taken advantage of "The Registration Act," and registered Aug. 9th, 1879.

September 5, 1885.—Received a request to investigate the case of C. T. Vanderlip, of Waverly—the man employing Charles Stanley, of Waterloo. We learned that he graduated from the New York College of Dentistry in the class of '84.

September 24, 1885.—Charges were preferred against Wm. N. Porter, of Cazenovia. Upon communication with him, ascertained that he had been practicing about twenty-one years—the greater part of the time in this State and in St. Louis, Mo. He was notified that he was practicing illegally, and that he would be prosecuted unless he discontinued practice, which he agreed to do until he had an opportunity to pass the Board of Censors.

September 24, 1885.—The case of David Lord, of DeRuyter, was reported. It was ascertained that he had registered June 6, 1881 in Tioga County.

November 9, 1885.—Received charges against Frank Adams, of Avon. Upon communicating with him, he acknowledged that he had no legal qualifications for practicing, but as he intended to apply to the State Censors for an examination in May, 1886, he did not think he was violating the dental law. He was notified that he must immediately discontinue practice or be prosecuted. He then gave the matter into the hands of an attorney, who made a full statement of his case, and asked that he be permitted to practice until the next meeting of the Board of Censors. He was informed that the Committee had no power to grant an extension of time, and the only course was to close his office, which he finally did.

November 19, 1885.—The case of C. W. Wicher, of Far Rockaway, was brought to notice. It was found that he had practiced previous to June 20, 1879, and had registered in Kings County, June 20, 1881.

January, 1886.—Charges were received against R. E. Berdsley, of Rochester. Ascertained that he is employed at a stipulated salary by G. W. Gleason, a registered dentist.

January 2, 1886.—Was requested to investigate the case of F. Nye, of Postdam. Ascertained that he was not practicing on his own account, but was employed as an assistant by Dr. Welch.

April 15, 1886.—Charges preferred against G. W. Traphagen, of Glen's Falls. Ascertained that he had been employed at a salary for three years by Dr. W. S. Huntington of Glen's Falls, and last autumn he was employed as an assistant by H. E. Potter, of Sandy Hill, Washington County.

April 15, 1886.—The attention of the Committee was directed to an establishment known as "The Manhattan Dental Parlors," at 573-575 Eighth Avenue, New York city. The Chairman of the Committee called at this place and found A. J. Hecker in charge. Upon being asked if he was legally qualified to practice dentistry, he acknowledged that he was not, but added that he was a student of the New York College of Dentistry, and was practicing under the name of a physician. After an interview with both physician and student, they decided that it would not be prudent for them to stand prosecution, and the office was closed. A. J. Hecker has since gone to Philadelphia.

May 3, 1886.—Complaint was entered against George T. Hall, of West Bloomfield, Livingston County. In reply to inquiries, he admitted that he was practicing without legal authority. He is a student of the Philadelphia Dental College. He stated that he had no desire to violate the law, but wished to earn some money to defray his college expenses. He was notified that he must abandon practice or be prosecuted.

To recapitulate briefly: Of the fifteen persons against whom complaints were entered, five are practicing as assistants; one is a graduate of the New York College of Dentistry; five are registered—therefore they are legally qualified; and four have discontinued practice.

We call attention to the fact that a bill was before the present Legislature, making it a misdemeanor for a dentist who is not a graduate in medicine, to administer chloroform, or ether as an anæsthetic. After consulting a number of the dental profession, it was deemed best to make no objections to its passage.

During the past year the Committee received twelve applications to practice in this State, from dentists of other States. Ten of them were found to be non-graduates, and they were informed that they must either graduate from a reputable dental college, or must pass the State Bord of Censors: of these, nine decided to remain where they were, and one signified his intention to appear before the Censors at this meeting. Two were graduates of colleges whose diplomas are recognized by this Society, and they are now practicing in this State. All which is respectfully submitted.

William Carr,
A. M. Holmes,
C. F. Wheeler,
Committee on Dental Law.

On motion the report was received and ordered on file.

Dr. Wm. Carr read the following bill, (No. 798,) which he said had been introduced by Mr. Edson, read twice and referred to the committee on public health, reported from said committee for the consideration of the House and committed to the committe of the whole, and ordered, when printed, to be recommitted to the committee on public health :

AN ACT

TO PROHIBIT DENTISTS FROM ADMINISTERING CHLOROFORM OR ETHER.

The People of the State of New York, represented in Senate and Assembly, do enact as follows :

Section 1. A dentist who shall administer chloroform or ether to any person unless said dentist shall be a regularly graduated physicician from some legally incorporated shool of medicine and surgery is guilty of a misdemeanor.

§ 2. This act shall take effect on and after the first day of September, eighteen hundred and eighty-six.

Dr. Carr also said that Mr. Edson desired the views of the Society on the subject, and had expressed the wish to be present during the discussion.

Assemblyman Edson was then introduoed by Dr. Carr, and the discussion of the bill proceeded with, Drs. John J. Pitts, W. H. Atkinson, A. E. Hill, F. D. Nellis, Wm. Carr, A. R. Starr, A. N. Priest, M. E. Elmendorf, C. W. Harveys, A. C. Rich, Chas. S. Butler taking part.

The motion to adopt was lost by a unanimous vote.

Dr. W. W. Walker moved that the result of the vote just had be communicated to Mr. Edson by the Chairman of the Committee on Dental Law. The motion was carried.

The Committee on By-laws reported as follows:

The Committee on By-laws respectfully reports that it has examined the books, accounts and vouchers of the Treasurer, and finds them strictly accurate and correct.

(Signed.) **Hyman Rosa,**
M. H. Smith,
W. W. Walker.
Committee.

On motion of Dr. O. E. Hill the report of the Committee was received and the financial part of the Treasurer's report adopted.

The Committee on Dental Practice reported in substance:

The Committee on Dental Practice has seen neither appliances nor apparatus introduced into the profession within the year as worthy of especial notice, beyond the claims of manufacturers of the same.

F. D. Nellis,
B. T. Mason,
M. D. Jewell,
Committee.

Dr. A. P. Southwick, Committee on Lost Transactions, reported in substance as follows:

I called upon the former Secretary and Chairman of the Committe of Publication, and obtained the Transactions for 1880 and 1881, apparently complete. Parts of the Transactions for 1879 are missing. Just before leaving home I received the following note, which I will read:

14 Court St., Buffalo, N. Y.,
May 10th, 1886.

Dr. A. P. Southwick:

Dear Sir:—Agreeable to your request, made on behalf of "The Dental Society of the State of New York," I have caused to be transferred from the printing establishment of Matthews, Northup & Co. into your hands the unpublished transactions of the above Society for 1879, 1880 and 1881, which firm had the contract for printing the same, made in good faith with me while an officer of the Society.

The proceedings of 1879 were passing through the press in compliance with this contract when the printing house was destroyed by fire, whereby a small portion of the matter of that year was lost. Considerable work had been done, for which they have received no pay. Respectfully,

S. A. Freeman.

Also the following bill:

Buffalo, N. Y., July 9th, 1885.

Dental Society State of New York,

To Matthews, Northup & Co. Dr.

1884

Dec. 1.—To work done on Proceedings Annual Meeting.............. $50 00

Dr. Chas. S. Butler moved that the report be received and placed on file, and that the Committee on Lost Transactions be discharged.

The reports of the several District Societies were then read by the Secretary.

FIRST DISTRICT.

The annual meeting of the First District Dental Society was held in the city of New York, Tuesday evening, April 6, 1886. The election of officers resulted in the re-election of the incumbent officers, as follows, viz.:

President, William Carr, 35 West 46th Street.

Vice-President, J. F. P. Hodson, 19 West 39th Street.

Secretary, Benj. C. Nash, 433 West 57th Street.

Treasurer, Charles W. Miller, 331 Madison Avenue.

Librarian, J. Bond Littig, 113 West 47th Street.

The Board of Censors, elected 1883 for five years, are as follows: Dr. E. A. Bogue; Dr. W. A. Bronson; Dr. C. A. Woodward; Dr. Frank Abbott; Dr. A. L. Northrop, Chairman.

The standing committees appointed by the chair:

Executive Committee—Dr. W. W. Walker, Dr. A. L. Northrop, Dr. C. E. Francis.

Clinic Committee—Dr. C. F. W. Bödecker, Dr. W. H. Atkinson, Dr. W. D. Tenison.

Delegates to the State Dental Society—Dr. Alfred Russell Starr, Dr. F. Austin Roy, each for four years, and Dr. Martin C. Gottschaldt for three years (vice B. C. Nash.)

The Society's meetings during the year past have numbered eight regular and one special meeting, and have proved of unusual interest to the profession.

The Seventeeth Anniversary was elaborately celebrated on the afternoon and evening of Wednesday, December 9th, 1885, and was largely attended by invited guests from neighboring cities, as well as by our own members and other resident dentists.

The usual clinics, which have long been a feature of this Society's work, were also continued, and the operations and exhibits there given doubtless proved of as much interest and benefit to the profession as in former years.

The Society continues the publication of its transactions in the *Dental Cosmos*.

The Society has suffered the loss, through death, of one to whom the profession is deeply indebted for the introduction of the rubber dam as an aid to dental operations—I refer to the late Dr. Sanford C. Barnum.

Our meetings during the year have shown an increase in attendance, the average number present being over one hundred. This shows a growing interest in the workings of the Society. The list of members appended hereto numbers 102 active, 8 honorary, 9 non-resident, and 2 corresponding members.

Respectfully submitted,

B. C. Nash, Secretary.

ACTIVE MEMBERS.

Abbott, Frank, 22 W. 40th St.
Albert, H., 142 W. 34th St.
Allen, Geo. S., 51 W. 37th St.
Atkinson, Wm. H., 41 E. 9th St.
Baldwin, C. S. W., 100 E. 124th St.
Barnum, W. H., 127 W. 42d St.
Bishop, J. A., 32 W. 36th St.
Bödecker, C. F. W., 60 E. 58th St.
Bogue, E. A., 29 E. 20th St.
Bronson, W. A., 8 E. 34th St.
Büttner, H. W. F., 332 E. 14th St.
Cady, H. W. F., 20 Gramercy Park.
Carr, Wm., 35 W. 46th St.
Chain, M. L., 30 Cooper Union.
Clowes, J. W., 667 Fifth Ave.
Davenport, W. F., 54 W. 37 St.
Deane, W. C., 143 E. 52d St.
Degenhardt, C., 123 Avenue A.
De Vries, Henry, 132 W. 44th St.
Dodge, M. H., 20 E. 33d St.
Dubar, C. L., 251 W. 22d St.
Dubois, C. A., 157 E. 27th St.
Dwinelle, W. H., 15 W. 34th St.
Ewing, H. J., 154 W. 48th St.
Farrar, J. N., Broadway and 32d St.
Feindel, J. H., 115 Second St.
Flagg, Eben M., 44 E. 9th St.
Fletcher, Thos. A., 67 W. 54th St.
Francis, C. E., 33 W. 47th St.
Gage, Arthur R., 47 E. 29th St.
Gates, C. Bailey, 102 E. 31st St.
Gibson, K. C., 66 W. 35th St.
Goodwillie, Jas., 73 W. 46th St.
Gottschaldt, Martin C., 136 E. 29th St.
Hassell, Samuel, 112 W. 38th St.
Henriquez, J. M., 43 W. 49th St.
Hiller, W. G., 169 W. 10th St.
Hoag, W. E., 13 E. 43d St.
Hodson, J. F. P., 19 W. 39th St.
Howe, J. Morgan, 34 W. 35th St.
Howells, E. W., 102 W. 48th St.
Howland, S. F., 39 W. 42d St.
Hoyt, E. P., 17 W. 39th St.
Hurd, W. W., 42 E. 19th St.
Ives, C. F., 34 W. 35th St.
Jackson, V. H., 6 E. 126th St.
Keech, C. H., 50 Third Ave.
Kingsley, N. W., 25 W. 27th St.
LaRoche, W. T., 67 W. 54th St.
Latimer, C. E., 102 W. 48th St.
Latimer, J. S., 102 W. 48th St.
Littig, J. B., 113 W. 47th St.
Meigs, G. S., 156 W. 45th St.
Merritt, Chas., 39 W. 42d St.
Mersereau, G. B., 32 E. 28th St.
Meyer, John H., 159 W. 34th St.
Miller, A. B., 33 W. 47th St.
Miller, Chas. W., 331 Madison Ave.
Minner, Edmund E., 4 W. 22d St.
Moore, J. W., 67 W. 9th St.
Morse, D. E., 157 E. 77th St.
McNaughton, S. H., 37 W 42d St.
Nash, B. C., 433 W. 57th St.
Nisley, John C., 35 W. 46th St.
Northrop, A. L., 57 W. 49th St.
Odell, F. M., 7 W. 38th St.
Palmer, Delos, 134 W. 45th St.
Payne, E. T., 22 W. 38th St.
Perry, B. J., 311 Madison Ave.
Perry, S. G., 46 W. 37th St.
Phillips, Chas. E. H., 33 W. 47th St.
Pressler, V., 105 E. 60th St.
Price, S. B., 13 W. 32d St.
Rabell, C. F., 109 W. 22d St.
Reed, J. Howard, 32 W. 19th St.
Remington, F. A., 57 W. 49th St.
Rhein, M. L., 7 W. 38th St.
Roy, F. Austin, 165 W. 53d St.
Sabater, D. M., 467 W. 22d St.
Sailer, Z. T., 40 W. 33d St.
Sichel, M., 114 E. 56 St.
Simon, Sam'l, 111 Varick St.
Sisson, Henry H., 234 W. 25th St.
Slocum, L. M., Cooper Union.
Smith, Dwight, 3 E. 47th St.
Sproull, J. C., 667 Madison Ave.
Spooner, S. C., 243 W. 14th St.
Starr, A. R., 164 E. 91st St.
Stebbins, R. O., 111 W. 34th St.
Taylor, J. W., 123 E. 59th St.
Tenison, W. D., 45 E. 28th St.
Todd, Elbert, 47 E. 29th St.
Toledo, M. V., 113 E 18th St.
Wadsworth, T. A., 159 W. 34th St.
Walker, W. W., 67 W. 9th St.
Wardwell, I. F., 7 W. 38th St.
Wardwell, C. S., 7 W. 38th St.
Weld, G. W., 13 W. 26th St.
Williams, D. A., 364 9th Ave.
Williamson, D. W., 121 W. 21st St.
Winkle, A. F., 59 E. 59th St.
Woodward, C. A., 38 W. 34th St.

HONORARY MEMBERS.

Dr. John Allen, New York.
Dr. E. Parmly Brown, Flushing, L. I.
Dr. T. H. Burras, Patchogue, L. I.
Mr. C. Geo. Crowley, New York.
Mr. Frank Harmstad, New York.
Dr. Carl Heitzmann, New York.
Dr. Arnold C. Hawes, Noroton, Conn.
Dr. Charles Miller, New York.

NON-RESIDENT MEMBERS.

Dr. R. R. Andrews, Cambridge, Mass.
Dr. Edwin T. Darby, Philadelphia, Pa.
Dr. S. H. Guilford, Philadelphia, Pa.
Dr. C. N. Peirce, Philadelphia, Pa.
Dr. Jas. Truman, Philadelphia, Pa.
Dr. F. H. Gardiner, Chicago, Ills.
Dr. A. W. Harlan, Chicago, Ills.
Dr. John J. R. Patrick, Belleville, Ills.
Dr. F. A. Levy, Orange, N. J.

CORRESPONDING MEMBERS.

Dr. G. V. Black, Jacksonville, Ill.
Dr. F. H. Lee, Auburn, N. Y.

SECOND DISTRICT.

The annual meeting of the Second District Dental Society was held in the city of Brooklyn, on Monday, March 8th, 1886, at the office of Dr. C. W. Harreys, 168 Bedford Ave. The election of officers for the ensuing year resulted as follows:

President, C. W. Harreys; Vice-President, J. J. Pitts; Recording Secretary, F. T. Van Woert; Corresponding Secretary, F. S. Emerson; Treasurer, L. G. Wilder; Librarian, W. A. Campbell.

Censors—H. G. Mirick, A. H. Brockway, Wm. Jarvie, J. H. Holly and O. E. Hill.

Delegates to the State Society—W. A. Campbell, vice J. P. Geran, F. T. Van Woert, vice F. T. Van Woert.

There were present at this meeting twenty-two members. We now have an active membership of seventy. During the year four meetings have been held, three in the city of Brooklyn and one at Newburgh. The average attendance has been good, and the Society is in a prosperous condition, the Treasurer's report showing a balance of $545.80, an increase of $98.02 over the previous year.

Respectfully submitted,

F. T. Van Woert, Rec. Secretary.

THIRD DISTRICT.

The Third District begs leave to report everything in a very satisfactory condition. We have held two meetings during the year, with an attendance much larger than usual. Total number of members in good standing sixteen. Financially we are "A No. 1."

A. M. Wright, Secretary.

FOURTH DISTRICT.

The Fourth District Dental Society held its annual session at the Town Hall, Saratoga Springs, Aug. 11th, 1885. The attendance was small, but with a slight increase in interest. The following officers were elected:

President, G. E. Lamb, Port Henry; Vice-President, J. P. Niles, Ballston Spa; Secretary, A. C. Rich, Saratoga Springs; Treasurer, J. H. Collins, Granville.

Censor—A. C. Rich, re-elected.

State delegates for four years—E. Doolittle, Schuylerville; O. J. Gross, Schenectady.

The Treasurer reported a small balance, as usual, and the Secretary was empowered to present to the State Society its claim for a reduction of dues to the State Society. Society adjourned to meet at Saratoga Springs on the second Tuesday in August, 1886. A. C. Rich, Secretary.

FIFTH DISTRICT.

The Fifth District Dental Society has held two meetings since our last report, a semi-annual in union with the Sixth District Dental Society, at Binghamton, Oct. 13th and 14th, 1885, and an annual meeting at Rome, April 13th and 14th, 1886. The attendance has been large, and much interest has been manifested. Five names have been added to the membership roll since the last annual meeting. The following are the officers for the ensuing year:

President, G. L. Curtis, Syracuse; Vice-President, C. H. Bennett, Waterville; Recording Secretary, C. J. Peters, Syracuse; Correspondent, B. T. Mason, Phœnix; Treasurer, A. R. Cooke, Syracuse; Librarian, A. Retter, Utica.

Delegates to State Society for four years—C. C. Smith, Ilion; G. H. Butler, Skaneatelas.

The next meeting will be the eighteenth semi-annual, at Syracuse, Oct. 26th, at which meeting delegates will be elected to attend the union meeting of the Seventh and Eighth District Dental Societies at Rochester, Oct. 26th and 27th, 1886. Things look bright and encouraging in the Fifth District.

Chas. J. Peters, Rec. Secretary.

The following are members in good standing:

Chas. Barnes, Syracuse.
J. P. Beardsley, Clinton.
C. H. Bennett, Waterville.
B. H. Billington, Syracuse.
H. P. Chambers, Lowville.
A. B. Cowles, Rome.
I. C. Curtis, Fulton.
G. L. Curtis, Syracuse.
Chas. E. Cherry, Syracuse.
G. L. Elliott, Syracuse.
G. V. Emens, Fulton.
J. C. House, Lowville.
G. F. Horsey, Utica.
S. E. Macdougall, Clinton.
B. T. Mason, Phœnix.
F. D. Nellis, Syracuse.
G. H. Butler, Skaneateles.
A. R. Cooke, Syracuse.
G. E. Nearing, Syracuse.
S. B. Palmer, Syracuse.
A. N. Priest, Utica.
C. J. Peters, Syracuse.
S. M. Robinson, Watertown.
G. V. N. Relyea, Oswego.
A. Retter, Utica.
E. L. Sargent, Watertown.
E. L. Swartwout, Utica.
C. C. Smith, Ilion.
W. J. Southerton, Syracuse.
A. A. Stillman, Syracuse.
H. W. Tompkins, Clayville.
F. G. Tibbitts, Fayetteville.
E. C. Van Deusen, Fulton.
A. W. Marsh, Constantia.
M. A. Peck, Syracuse.
R. F. Jones, Utica.

Delegates to State Society—A. Retter, Utica, E. L. Swartwout, Utica, four years from April, 1883; G. V. N. Relyea, Oswego, and F. G. Tibbitts, Fayetteville, four years from April, 1884; G. L. Curtis, Syracuse, and G. V. Emens, Fulton, four years from April, 1885; C. C. Smith, Ilion, and G. H. Butler, Skaneateles, four years from April, 1886.

SIXTH DISTRICT.

I would respectfully submit the following report: There have been two meetings of this Society during the past year. The semi-annual meeting was held at Binghamton in union with the Fifth District Society, and was a very interest meeting.

The regular annual meeting was held in Binghamton on May 11th. Twenty-two (22) members were present, and showed by their active participation in the discussions, their interest in the meetings. One new member was admitted at this meeting.

The following is the list of officers elected for the ensuing year:

President, G. W. Melotte, Ithaca; Vice-President, S. W. Adamy, Union; Cor. and Rec. Secretary, E. D. Downs, Owego; Treasurer, Frank B. Darby, Elmira; Censor, C. G. Sumner, Norwich.

Delegates to State Society—G. W. Melotte, Ithaca, four years from May, 1886; F. B. Darby, Elmira, four years from May, 1886; C. E. Dunton, Cazenovia, one year from May, 1886, vice C. E. Ingalls, resigned.

The following is the list of membership:

R. Walker, Owego.
G. W. Hoysradt, Ithaca.
F. B. Darby, Elmira.
L. E. Ireland, Oneonta
E. S. Walker, Greene.
E. A. Mayor, Owego.
G. W. Melotte, Ithaca.
S. W. Adamy, Union.
C. G. Sumner, Norwich.
G. A. Denike, Binghamton.
Frank Howe, Ithica.
E. Nelson, Waverly.
E. D. Downs, Owego.
M. D. Jewell, Richfield Springs.
C. W. Spencer, Afton.
W. S. Fish, Sherbume.
L. E. Knapp, Deposit.
C. W. McCall, Binghamton.
A. E. Bradley, Norwich.
C. B. Crandall, Brookfield.
A. M. Holmes, Morrisville.
W. S. Cameth, Cincinnatus.
A. D. Turner, Binghamton.
F. M. Snook, Waverly.
C. A. Perkins, Binghamton.
F. S. Howe, Ithaca.
C. H. Eccleston, Oxford.
N. B. Gregory, Unadilla.
C. E. Ingalls, Cortland.
G. H. Smith, Cortland.
M. H. Fish, Sherbume.
C. W. Cox, Horseheads.
A. L. Spencer, Unadilla.
C. E. Dunton, Cazenovia.
W. Spencer, Whitney's Point.
W. C. Stewart, Elmira.
C. C. Sears, Bainbridge.
R. A. Kneeland, Franklin.
E. Goddard, Elmira.
M. O. Landon, Delhi.

An invitation was received and accepted from the Seventh District Society, to unite in a union meeting to be held by the Seventh and Eighth District Societies, an invitation having also been extended to the Society of the Fifth District.

E. D. Downs, Rec. Secretary.

SEVENTH DISTRICT.

This Society met in joint convention with the Eighth District Society, at Buffalo, in October, and enjoyed one of the largest meetings ever held by the dental profession of Western New York.

The eighteenth annual meeting was held at Rochester, April 27th and 28th. Twenty-seven members and ten visitors were present. Four original papers were read and discussed. Dr. Maurice Leyden, of Rochester, was made an honorary member. Two new names were added to the list of members. The Society now numbers forty members.

The officers for the year are as follows:

President, B. G. Saunders, Rochester; Vice-President, C. Elmendorf, Penn Yan; Recording Secretary, Chas. T. Howard, Rochester; Corresponding Secretary, J. Edw. Line, Rochester; Treasurer, J. Requa, Rochester.

Censor, J. H. Beebee, Rochester.

Delegates to State Society for four years—F. A. Greene, M. H. Smith, (re-elected.) Terms expire 1890.

Names dropped from the list of members as published in the State Society transactions for 1885: J. D. Maynard, New York; B. R. McGregor, Summit, N. J.; B. F. Schuyler, Rochester.

Names of new members: W. A. White, Phelps; E. A. Clapp, Livonia.

The Society's treasury is in excellent condition, and its meetings are well attended.

Chas. T. Howard, Rec. Secretary.

EIGHTH DISTRICT.

The annual meeting of this Society is held upon the third Tuesday of April of each year, (next meeting April 19th, 1887,) and the semi-annual meeting upon the third Tuesday in October, (next meeting October 26th, 1886.)

During the past year two meetings have been held as provided for by the by-laws. The annual meeting of the present year was held at Buffalo, April 20th, and proved both profitable and spirited, there being in attendance twenty eight members and twenty visitors. Five original papers were read and discussed, and the usual amount of business transacted.

The following officers were elected to serve for the ensuing year, to wit: President, L. R. Leach, Hamburgh; Vice-President, J. Granger, Mayville; Recording Secretary, S. A. Freeman, Buffalo; Corresponding Secretary, B. Rathbun, Dunkirk; Treasurer, C. W. Stainton, Buffalo; Librarian, M. B. Straight, Buffalo. Censor for four years, J. C. Gifford, Westfield; for two years, C. S. Butler, Buffalo.

Delegates to State Society—C. S. Butler, Buffalo, (re-elected,) C. A. Allen, Buffalo, (re-elected.)

The active membership of the Society now includes the names of 44 dentists, six having been added to the roll since our last report, namely: W. V. Grove and S. Eschelman, Buffalo; D. E. Barrows, Olean; F. W. Low, Attica; W. C. Proctor, Gowanda; and W. E. Richardson, Batavia. Three have resigned, as follows: L. F. Harvey and N. Whitcomb, of Buffalo, and E. H. Danforth, of Jamestown; and T. A. C. Everett, of Randolph, was expelled for non-payment of annual dues.

The Society is harmonious, prosperous and exerting a beneficial influence among dentists in Western New York. The financial condition is encouraging, and the Society's library steadily increasing.

Respectfully submitted,

S. A. **Freeman**, Rec. Secretary.

The Secretary stated that no reports had been received from Dental Colleges.

The Degree of Master of Dental Surgery was then conferred upon J. H. Trull, W. W. Frazer and J. L. Appleton, who were addressed by the President as follows:

Gentlemen:—I always feel like rejoicing when men step out of the ordinary routine of life and aspire to something higher.

You who have come before the State Board of Censors have shown that you were actuated by a desire to possess something which money could not buy, but which I trust will be of untold value to you.

I congratulate you upon having passed the ordeal, which I know was not a trifling one, and in the preparation for it much hard work has been required; but the end justifies the outlay, and you stand to-day in the eyes of the world, masters of your calling. And it therefore gives me pleasure, in the name of the Dental Society of the State of New York, to prounounce you Masters of Dental Surgery.

I trust that this degree will be an inspiration which will abide by you, and inspire you to greater attainments, and an honorable position in the profession which you have chosen.

Let not your ambition cease here, but rather go on, not only doing good to suffering humanity, but doing honor to your calling by adding to the sum of human intelligence, and with an earnest desire to do your duty, you will in time reap the full reward to which you are entitled.

Dr. A. M. Holmes said Mr. Watts, of ————————, would like to attend the Baltimore College of Dental Surgery, under the auspices of this Society.

Dr. O. E. Hill moved that the Society send Mr. Watts, the gentleman named, to the Baltimore College of Dental Surgery as its beneficiary student. Carried.

The Secretary reported as follows:

Immediately after the close of the meeting of '85, the Secretary had the diplomas (three in number) suitably engrossed, and mailed them to the gentleman named in the Censor's report.

Calls for this meeting were issued in April, and scattered among dentists throughout the State; also later, programmes were sent to all permanent and delegate members.

The permanent membership of the Society is 69, honorary 16, corresponding 2.

The Secretary read a letter from Dr. C. W. Harvey, of Buffalo, resigning his membership in the Society. Received and placed on file.

Also a letter from Dr. L. F. Harvey, of the same city, offering his resignation. The communication was received and the resignation accepted.

The Secretary also read the following, under date of May 7th, '86, from Dr. N. W. Kingsley:

Be kind enough to present to the Dental Society of the State of New York my resignation of its membership, which is hereby tendered.

Dr. C. F. Ives moved that it is the expressed wish of the Society that Dr. Kingsley withdraw his resignation.

The motion was carried unanimously.

Dr. W. H. Atkinson moved that the resignation be laid upon the table until Dr. Kingsley could be heard from. Carried.

Dr. O. E. Hill moved that the President telegraph Dr. Kingley the action of this body, and request an immediate reply. Carried.

The Secretary presented several bills, which were referred to the Committee on By-laws.

Dr. F. French moved that the Business Committee be instructed to make the election of officers the second order of business for the following (Thursday) morning. Carried.

The Treasurer, Dr. H. G. Mirick, offered the following:

Resolved, That the Treasurer be directed to write to all members in arrears to the Society, informing them that unless all dues are paid before the next annual meeting, action will be taken towards their dismissal. Carried.

Dr. O. E. Hill moved the following amendment to Section 24 of the Code (See page 26 of Transactions of '85): Insert, "with the aid of the President, secure essayists and arrange a suitable programme for the annuaal meeting. Said Committee shall also," making Section 24 read:

"The Committee on Business shall, with the aid of the President, secure essayists and arrange a suitable programme for the annual meeting. Said Committee shall also arrange the order of business," etc.

Dr. Hill also moved the following as a substitute for Sections 19, 20 and 21 of the Code:

The Board of Censors shall hold its annual meeting the day before and at the place of the annual meeting of the Society. The Board shall choose a chairman and secretary, and make rules for its own government, not inconsistent with the By-laws of this Society, and provide for special meetings, when the number of candidates for examination shall require it. The Censors shall require of each candidate satisfactory proof that he has complied with the requisitions of the State law regulating the practice of dentistry, together with a certificate of good moral character and professional attainments. Certificates of candidates belonging in this State shall be from the Censors of the District Society in which the candidate resides, and certificates of those residing elsewhere shall be endorsed by three members of this Society. The Censors shall carefully and impartially examine each candidate in the principles and practice of dental surgery, and if such inquiry and examination shall be satisfactory, they shall recommend him to the Society for a diploma, signed by the President, Secretary, and Board of Censors granting the degree, of "Master of Dental Surgery."

Dr. C. S. Butler moved that the proposed amendments to the Code be tabled until the following morning.

Dr. Wm. Carr, as Committee to communicate to Mr. Edson the wishes of the Society in regard the anæsthetic bill, reported that he had called upon that gentleman, and had been informed that the bill would remain where it was.

The Committee on Business reported the following for the afternoon session:

Report of Committee on Prize Essays; papers by Dr. W H. Atkinson and M. D. Jewell. Adjourn to 8 o'clock.

Adjourned to 3:30.

FIRST DAY—AFTERNOON SESSION.

The Society met again at 3:30 P. M.

The minutes of the morning session were read by the stenographer and approved as read.

Dr. W. H. Atkinson, of New York, then presented "A Case in Practice." (See page 84, July issue.")

Dr. Myron D. Jewell read a paper on "Physiognomics in Dental Prognosis." (See page 70, July issue.)

The Committee on Prize Essays presented the following:

The Committee on Prize Essays would respectfully report that but one paper has been sent in for examination, an essay on "The Conservation of the Vital Forces," by Julien W. Russell, M. D. S., a member of the Second District Society. By the terms of Dr. B. T. Whitney's will the prize would *seem* to be restricted to members of the State Society alone, and your Committee are in doubt whether this will not forbid them recommending it for acceptance as entitled to the prize offered by the Society.

Albert H. Brockway,
S. B. Palmer,
James H. Race,
Committee.

Following a general discussion of the intent of the doner and the terms of the gift, Dr. Chas. S. Butler moved the recommittment of the report with instructions to award the prize, if in the judgment of the Committee the paper was worthy of it. Carried.

The Committee on Business reported the following programme for the evening session :

Reading of minutes of afternoon session; incidents of office practice; paper by Dr. A. H. Brockway; paper by Dr. C. S. Butler; adjournment to 9 o'clock the following (Thursday) morning.

Dr. A. H. Brockway, of the Committee on Prize Essays, offered the following :

The Committee on Prize Essays begs leave to report that but one paper has been submitted to it, an essay on "The Conservation of the Vital Forces," written by Julien W. Russell, M. D. S.

Regretting that the lack of interest among the members of the profession has left the Committee no opportunity for selection, and in accordance with a former precedent, it hereby recommends the paper for the prize offered by the Society.

ALBERT H. BROCKWAY,
JAMES H. RACE,
S. B. PALMER,
Committee.

The report was received.

On motion of Dr. M. E. Elmendorf, the proposed amendments to the Code were called up and discussed, and then adopted. (See page —.)

Dr. O. E. Hill moved that the Committee on Publication be instructed to issue the By-laws in pamphlet form, and that the same pamphlet contain all the laws past and present relating to the practice of dentistry in this State; also that the Committee publish as many copies as in its judgment seems desirable. Carried.

Dr. A. C. Rich reported the financial condition of the Fourth District Society as bad, and that he had been commissioned to request the State Society to reduce its dues.

The Treasurer said the Fourth District Society was indebted to the State Society for two years dues; the annual dues to this Society were remitted in 1881, 1882 and 1883.

Dr. O. E. Hill moved that the dues of the Fourth District Society be remitted for 1885 and 1886. Carried.

Adjourned to 8 o'clock P. M.

FIRST DAY—EVENING SESSION.

The Society met at 8 o'clock.

The minutes of the afternoon session were read by the stenographer and approved as read.

The Committee on By-laws reported favorably upon the bills presented by the Secretary at the morning session.

On motion of Dr. C. S. Butler, the report was received and filed, and the bills ordered paid.

Dr. A. H. Brockway read a paper on "Rapid Operations." (See page 78, July issue.)

Dr. C. S. Butler read a paper on "Care of the Teeth as a Preventive of Decay." (See page 82, July issue.)

Both papers were discussed at length by Drs. W. H. Atkinson, S. B. Palmer, C. F. Wheeler, C. F. Ives, John Allen, G. W. Melotte, C. S. Butler, and A. R. Starr.

The Committee on Business reported that adjournment at the close of the evening session would be to 9 o'clock the next morning. It would be necessary to begin thus early in order to get through by 12 o'clock, as the room was wanted at that hour by members of assembly.

The order of business for the morning session would be:

Election of Officers, Report of Correspondent, Reading of Prize Essay, Paper by Dr. E. Parmly Brown, Appointment of Committees, Miscellaneous Business, Adjourn.

Adjourned to 9 o'clock Thursday morning.

SECOND DAY—MORNING SESSION.

Thursday, May 13, 9 o'clock.

The minutes of the evening session were read by the stenographer and approved as read.

The election of officers being in order, the President appointed Drs. E. D. Downs, C. S. Butler and B. T. Mason tellers.

The Secretary presented the bill of the stenographer, Mr. W. H. Lansing, ($68.50) which was referred to the Committee on By-Laws.

The tellers announced forty-six votes for President, of which:—

Dr. Norman W. Kingsley receiving . . 25
" Frank B. Darby " . . 21—46

Dr. C. F. Ives moved that the election of Dr. Kingsley be made unanimous. Carried.

The Secretary presented a bill for telegram to Dr. Kingsley. Referred to Committee on By-Laws.

On the fourth ballot for Vice-President 49 votes were cast.

Dr. B. Rathbun receiving....27
" W. W. Walker " ....22—49

Dr. Rathbun was declared elected.

While the second ballot was being counted, Dr. H. G. Mirick moved the appointment of a committee of one from each district to nominate permanent members. Carried.

The President appointed as such committe—Drs. A. R. Starr, O. E. Hill, P. Sloan, C. F. Rich, S. B. Palmer, M. D. Jewell, F. French and A. P. Southwick.

The Committee on By-Laws reported favorably on the bill for telegram to Dr. Kingsley, 50 cents, also on the bill of the stenographer, $68.50.

The report was accepted and the bills ordered paid.

The vote for Secretary resulted as follows:

Dr. J. Edw. Line........33
" Chas. R. Butler...... 3—36

Dr. Line was declared elected.

The vote for Treasurer resulted:

Dr. H. G. Mirick........26

The vote for Correspondent:

Dr. W. H. Atkinson......Unanimous.

Dr. A. M. Holmes was elected censor for the Sixth district by a unanimous vote.

Dr. C. S. Butler here said:

> Before proceeding to ballot for censor for the Eighth district, I am requested to make an announcement to this Society. From the organization of this Society it has been the custom and practice for the members from the districts to name to this body the gentlemen they desired to represent them upon the Board of Censors. This custom has always been recognized in this body, and in accordance with this practice I am requested by the members here from the Eighth district to announce to this body that we have nominated for censor Dr. A. P. Southwick, for re-election, and ask that this Society ratify that nomination.

Dr. A. P. Southwick was then unanimously re-elected censor from the Eighth district.

The Committee on Nominations for Permanent Membership reported the following:

1st District,	Dr. W. W. Walker, New York.
3d "	Dr. S. P. Welch, Lansingburg.
4th "	Dr. O. J. Gross, Schenectady.
6th "	Dr. W. C. Stewart, Elmira.
7th "	Dr. F. A. Greene, Geneva.

Dr. B. F. Mason moved that the Secretary cast one ballot for the gentlemen reported by the Committee. Carried.

The Secretary cast the ballot as directed, and the several nominees were declared duly elected permanent members.

The Correspondent, Dr. W. H. Atkinson read the following report.

As far as subject matter for a report to be derived from society correspondence is concerned, I have nothing of moment to refer to. Farther than a few requests for addresses of officers of this Society, or of other members of the dental profession, I have received no communications belonging to the office of Correspondent. Our Secretary will deliver the result of my labors in the direction of a circular, which, it is hoped, will open the door to an interchange of views and act as a stimulus to us all to give, each from his store, for the general good, and form a basis upon which seekers may elaborate questions concerning their own difficulties. Remembering the timidity that youth feels in propounding questions, I offer a suggestion as to the manner of answering the questions just mentioned, or of asking other questions.

First it will be noticed the questions of the circular are numbered. A copy will be retained in the office of the Correspondent, which will make it unnecessary to refer to any question other than by its number. Answers, other questions and further suggestions are invited.

Now for the suggestions: Correspondents, in this matter, need not sign their names, but are requested to use a distinctive signature or mark. This, it is hoped, will help the backward to take a hand in the good work.

Further, periodically (monthly or quarterly,) I propose that the answers be published either in a special society circular publication strictly confined to this special question and answer plan, and entirely excluding lengthy essays, which shall be under the charge of a committee selected for that purpose (or of the Secretary and Correspondent, or of the Correspondent alone) whose duty it shall be to sift the answers and publish those best answering the questions, or to publish the mass entire to be criticised in further correspondence, and the result published in subsequent issues. This I think the better plan, as the publication will be entirely under control of the Society for this sole purpose. The publication will be circulated at the expense of the Society to individual members and in such other fields as may be determined upon.

In lieu of this, I propose that an arrangement be made with one of our State dental journals to publish the matter in the same way. The unfortunate complication here, is that this either compels a subscription to the journal in question or excludes just the men we wish to reach, not to speak of a possible antagonism between editors who may be members of this Society.

Following is the circular:

1. What is decay, and upon what does it depend?

2. (*a*) Trace caries of a tooth, minutely, from its beginning to its regression to an abscessed condition, giving in detail the steps in the tooth and its surroundings in retrogressive metamorphosis, with (*b*) the treatment you would follow as each stage is reached, (*c*) and the explanations for the progression of the disease, (*d*) with its abortion if a possibility; (*e*) and if at any point or points of its progress systemic restoration or termination of the inflammatory process be possible, please so state and how. (*f*) When the disease, as such, be brought to a terminus, what is the further history of the minute anatomy of the tooth and its neighborhood under the treatment you pursue?

3. What material do you use for fillings, and why special kinds for special cases?

4. Do you combine any different materials in filling teeth; if so, what and for what purpose?

5. Do you use rubber dam in operating on the teeth; if so, how do you apply it?

6. (*a*) Do you use amalgam; if so, to what extent, (*b*) under what circumstances, (*c*) of what composition or of whose make; (*d*) how do you prepare it and how do you insert it. (*e*) How do you prepare the cavity for it, (*f*) and if you have any special practice in this direction please detail it and give the results of your amalgam work?

7. Do you use any separator; if so, how and for what purpose, and what kind or kinds, and what are the results?

8. Do you use any form of matrix; if so, for what purpose, and how and what kind or kinds, and what are the results?

9. Do you use arsenic; if so, does it effect the purpose you had intended?

10. (*a*) What is your practice in treating exposed pulps, from beginning to end; (*b*) give remedies and operative treatment?

11. How do you recognize an inflamed pulp?

12. Is a pulpless tooth an injury to the mouth?

13. If so, how, and how long do they last?

14. What is a pulp stone?

15. How is it formed?

16. Can it be remedied; if so, how?

17. What is your practice for placing artificial crowns?

18. What method do you prefer for correcting irregularities?

19. What systemic conditions have effect on the teeth?

20. What systemic effects have diseased teeth?

21. What do you understand by inflammation ?

22. What is the disease called pyorrhœa alveolaris ?

23. What tissue or tissues are affected by it ?

24. What is your method for diagnosis of pyorrhœa alveolaris ?

25. What is your opinion of local anæsthesia and what anæsthetic, if any, do you use, and what are the results ?

26. (*a*) To what diseased conditions is the antrum liable and (*b*) how do you diagnose and (*c*) treat them, and (*d*) what results do you obtain ?

27. How do you diagnose necrosis ?

28. (*a*) What is your treatment ? (*b*) Do you use the sponge graft for the reproduction of lost tissue, and what is your method ?

29. What is the action of creasote ?

NOTE.—1. In replying to the several questions, use letter paper, (size of this sheet) and write on one side only.

NOTE.—2. In replying to such questions as are sub-divided by letters an answer may be given to any sub-division, numbered thus: 2 *b* or 2 *f*, etc.

Dr. A. H. Brockway moved that the report be accepted and that the suggestions therein be carried out. Carried.

Dr. E. Parmly Brown read a paper on "All Porcelain Crowns and Bridge Work." (See page 103, July issue.) *

The paper was discussed by the essayist, Drs. G. W. Melotte and C. S. Butler.

Dr. M. E. Elmendorf moved that the usual order be drawn on the Treasurer, for one hundred dollars, in favor of the Secretary.

The motion was carried.

The Committee on Preceptor and Pupil Contract reported briefly through Dr. E. Parmly Brown:

He said nothing had been done—could not be done without legal advice, and a limited amount of money for expenses of same (say $30.00). He suggested that the Committee be put in the way of obtaining what was needed.

Dr. A. R. Starr moved that the report be accepted and the committee continued, with power to consult an attorney and obtain, if possible, an effective form of contract, and to report the same to this Society next year. Carried.

Dr. A. H. Brockway moved that the President, at his earliest convenience, appoint delegates to the American Dental Association—as many as the Society is entitled to. Carried.

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* For drawings, diagrams, etc., used by Dr. Brown on this occasion, also the substance of his explanations and remarks, See the *Dental Cosmos* for September, '86.

Dr. E. C. Baxter, of the Committee on New Quarters, reported that it would be impossible to have rooms set apart in the Capitol building for the use of this and other Societies. The probability is, however, that next year there will be a desirable hall on the corner of Steuben and Pearl streets, which can be had for a reasonable consideration.

Dr. A. H. Brockway moved that the thanks of the Society be tendered the Committee of Arrangements, and that the Committee be continued another year. Carried.

Dr. A. M. Homes moved that the reading of the Prize Essay be deferred to next year, and that it be published in the transactions. Carried.

The Society then adjourned.

Since adjournment President Kingsley has made the following appointments:

Arrangements—E. C. Baxter, S. D. French, A. C. Rich, (continued by vote of the Society).

Business—C. E. Francis, Chas. F. Ives, F. D. Nellis.

Prize Essays—M. D. Jewell, E. D. Downs, H. A. Birdsall.

Publication—J. Edw. Line, F. French, F. A. Greene.

By-Laws—C. S. Butler, J. H. Race, A. C. Rich.

Ethics—W. S. Stewart, F. E. Howard, S. W. Hoysradt.

Practice—E. Parmly Brown, C. F. W. Bodecker, W. C. Barrett.

Law—Wm. Carr, W. W. Walker, C. F. Wheeler.

NATIONAL ASSOCIATION OF DENTAL EXAMINERS.

The National Association of Dental Examiners held its fifth session at Niagara Falls, commencing Monday, August 2, 1886, President J. Taft in the chair.

The following were present: Ohio, J. Taft, H. A. Smith, and F. H. Rehwinkel; Illinois, Geo. H. Cushing; Michigan, A. T. Metcalf, F. W. Clawson, and G. S. Shattuck; California, S. W. Dennis; Pennsylvania, S. H. Guilford, W. E. Magill, and E. T. Darby; New

Jersey, Fred A. Levy ; Iowa, J. T. Abbott ; Maryland, T. S. Waters, Louisiana, Joseph Bauer ; Indiana, S. B. Brown ; Wisconsin, Edgar Palmer.

Officers were elected as follows : J. Taft, President ; H. A. Smith, Vice-President ; F. A. Levy, Orange, N. J., Secretary and Treasurer.

NATIONAL ASSOCIATION OF DENTAL FACULTIES.

The National Association of Dental Faculties held its third annual meeting at Niagara Falls, Monday, August 2d, 1886, President C. N. Pierce, Philadelphia, in the chair.

The following colleges were represented: *Pennsylvania*—C. N. Pierce ; *Chicago*—T. W. Brophy, A. W. Harlan, F. H. Gardiner, J A. Swasey and L. P. Haskell ; *Missouri*—W. H. Eames and A. H Fuller ; *Boston*—J. A. Follett ; *Philadelphia*—S. H. Guilford ; *University of Pennsylvania*—James Truman ; *Baltimore*—R. B. Winder ; *University of Iowa*—L. C. Ingersoll and A. O. Hunt ; *University of Michigan*—J. Taft and J. A. Watling ; *Ohio*—H. A. Smith ; *New York*—Frank Abbott ; *Kansas City*—C. B. Hewitt.

The following additional colleges were admitted to membership: *Minnesota Hospital College*—W. A. Spaulding ; *Vanderbilt University*—W. H. Morgan ; *University of California*—S. W. Dennis ; *Harvard University*—Thos. Fillebrown ; *St. Paul Medical College*—L. W. Lyon.

Dr. Winder, Chairman of the Committee on Text-Books, made a verbal report, which was freely discussed by all present.

On motion of Dr. Guilford, a committee of five, Drs. Abbott, Winder, Ingersoll, Guilford and Fillebrown, was elected to take the subject into consideration and prepare suggestions as to the general scope and plan to be followed in the preparation of a series of dental text-books.

Dr. Abbott offered the following, which was adopted and referred to the Executive Committee:

Resolved, That a standing committee on schools be elected, whose duty it shall be to ascertain as far as practicable the workings of all dental schools in this country and Europe, and be required to furnish information to the dean or secretary of any college when desired and to report in writing at each meeting of this association

Dr. Truman offered the following, which was adopted:

Resolved, That the dean of each school be required to furnish the executive committee with the exact character of the intermediate examination, and whether any of them are final.

Dr. Truman offered a resolution that the winter terms of dental colleges of this association shall be at least seven months in duration. Referred to representatives of colleges with the request that they report next year.

Dr. Guilford was appointed to codify the rules adopted by the association and prepare them for publication.

Dr. Fillebrown, Secretary of the Committee on Text-Books, reported that text-books are needed, as follows: Oral Surgery, Dental Pathology and Therapeutics, Operative Dentistry and Orthodontia, Dental Chemistry and Metallurgy, Dental Prosthesis.

Other subjects seemed to be well provided for. The report recommended that committees solicit the writing of books and examine manuscript, and authorize publication on the several conditions named in the report.

The report was adopted and chairmen appointed as follows: Oral Surgery, T. W. Brophy; Dental Pathology and Therapeutics, James Truman; Operative Dentistry and Orthodontia, Thos. Fillebrown; Dental Chemistry and Metallurgy, A. O. Hunt; Dental Prosthesis, S. H. Guilford.

The following were elected for the ensuing year: C. N. Pierce, President; R. B. Winder, Vice-President; H. A. Smith, Secretary; A. W. Harlan, Treasurer; Frank Abbott, James Truman, J. Taft, Executive Committee; Frank Abbott, James Truman, R. B. Winder, committee to decide questions arising before the next meeting.

KAVA, KAWA, KAVA-KAVA—A POWERFUL ANÆSTHETIC AND SPINAL DEPRESSANT.

Since the advent of cocaine in its several forms for use as an anæsthetic, the medical world has redoubled its efforts to find its equivalent, or better, its superior, and would seem to have met with encouragement, if not success, in the person of Dr. L. Lewin, of Berlin. We condense from the *Therapeutic Gazette* two of the leading contributions that have already appeared in regard to the substance and its effects on the system:

Kawa (Kawa-Kawa, Yakona, Yangona) is the root of Piper methysticum, a shrub three yards high, growing in Polynesia. The shrub is especially found on the New Hebrides, the Sandwich, Feejee, and Samoa Islands. The kawa-drinks reigned here until the introducion of alcohol; but to-day kawa is a favored drink in Polynesia, where kawa-houses exist like our cafès. Special men and women are selected to chew the root, then it is placed in vessels, water added, and stirred with the hands. The firm masses are then dissolved, and the kawa-drink is ready for use. The drink is served under prayers in half cocoa shells, and appears as a grayish dirty-looking fluid. The assumption that during the process of preparation a fermentation takes place is erroneous.

Chemically the root contains forty-nine per cent. of starch, numerous salts, and a non-nitrogenous body called kawahin. Lewin also found yangonin. Both these elements, however, have been proved to be inert. The actual active principle is a resinous mass of a fatty, aromatic taste, pungent and hot like pepper.

Local Action.—Kawa-resin increases the salivary secretion, and produces loss of sensitiveness immediately or shortly after application on all parts of the body. Taken into the mouth, one receives the sensation as if the part were burnt. Applied locally to the pharynx, the part grows anæsthetic even in the most sensitive persons. Gradually the increased salivary secretion and the anæsthesia of the pharynx disappear again. Applied to the conjunctiva of cold and warm-blooded animals, both conjunctiva and cornea lose the power of reaction to even the strongest irritation. The eyeball can be pressed, pinched, and rotated at will without producing a reaction. If the kawa-resin be injected into the connective tissue of an animal, anæsthesia ensues in the sphere surrounding the point of injection; mechanical and chemical irritation elicit no reflex response. At and surrounding the point of application no inflammatory symptoms appear, but, on the contrary, marked ischæmia.

Constitutional Action.—Ingested, the kawa-drink produces a sensation of comfort, peace and felicity, and never, as in the case of alcohol, desires of altercation or fight. In the mouth a peculiar, pleasant sensation of coolness is received, and may last for one or two hours. Consciousness and reason are in no way depressed, as in the case of opium, but the mental faculties are rather heightened. Fatigue and hardships appear easier borne under the influence of the drug. If larger quantities of the kawa-drink are ingested, a state of happy freedom of cares and a dreamy consciousness set in. The limbs grow feeble and powerless ; gradually the will loses its control over the motor apparatus, rendering co-ordinate movements impossible The person soon lies down, and gradually falls asleep, or rather in a condition of somnolency.

Nausea and headache, paresis of the extremities, and a nervous trembling are the usual sequelæ of kawa-ingestion after the somnolency has passed off. The system soon grows accustomed to the drug, and the kawa-habit is readily established.

Animal Experiments.—If kawa is administered to frogs per os or hypodermically, the animals soon grow feeble, the head sinks, and a state of motor incapacity ensues. Though voluntary motion has disappeared, reflex action is still active.

Lewin saw frogs in this condition for nine consecutive days ; only the reaction to light and the slow cardiac action still testified to the life of the animals.

A general central paralysis is produced by kawa in a manner that the anterior horns of the gray substance, the motor ganglia, are first attacked, and later the sensible elements in the posterior horns of the gray substance, and lastly the brain ganglia. In birds, rabbits, cats, we obtain the same physiological effects. At first motion is apparently increased, the animals endeavor to run or fly away ; then this desire vanishes, and the animal lies down ; temperature, respiration, and pulse fall gradually and simultaneously.

An alcoholic solution applied by the mouth or subcutaneously produces a deep sleep within a few miuutes. Part of the kawa-resin is eliminated with the urine. The gastric mucous membrane shows, after death, an ischæmic appearance. These interesting observations clearly demonstrate that in kawa we have to deal with a drug of a most energetic activity, and that its power to produce complete local ischæmia and anæsthesia, reduction of the excitability of the spinal motor apparatus, and besides psychical quiescence, can be unquestionably utilized in therapeutics.

Kawa promises to become almost as valuable, provided it can be readily handled, as cocaine now is.

The resin is a semi-fluid body, with a peculiar aromatic taste, pungent and hot like pepper ; when placed upon the tongue there is a momentary burning sensation, with increased salivary secretion, followed by local numbness, which may last for more than an hour. The kawa resin is too irritating to be applied to the human conjunctiva, but Dr. N. A Randolph thinks that by first instilling cocaine, so as to render the conjunctiva insensitive, kawa might then be used to produce more prolonged anæsthesia. Its use in dental practice also suggests itself, and in the hands of aurists and laryngologists, though the facts that it is insoluble in water and glycerin, and that an alcoholic solution has serious disadvantages, will perhaps somewhat restrict its usefulness. It may also, perhaps, be used in suspension in mucilage.

Still another use for the resin of kawa or kava, is in the treatment of gonorrhœa and acute affections of the urinary passages. The pain on micturition becomes less, the discharged decreases, and cure in many cases resulted in from ten to twenty days.

"WITHOUT HONOR," ETC.

It seems that in Dr. Herbst's country, as well as in some others, men are jealous and selfish. I am told on good authority that his persecutions in Bremen were of such severity that, had he not been a man of some means, he would have been driven to insanity. So bitter was the jealousy that resort was had to publishing and circulating pamphlets misrepresenting him as an insane idiot, associated with nothing but failure in his operations. Also a translation of a paper by Dr. E. Parmly Brown, originally published in the *Independent Practitioner*, and expressing views in opposition to the Herbst method, was circulated freely throughout the entire area of Bremen, indicating a purpose simply mean and devilish. With the results attending Dr. Herbst's visit to this country, as already detailed and which will ultimately be enhanced as his views become more widely diffused among us, Dr. Herbst can be heartily congratulated that he is able to return to his fellow countrymen with so many honors, and to lay before them testimony that ought to put them to the blush of shame.—*Archives of Dentistry.*

HAVE AN INTELLIGENT PURSUIT—STUDY MEN.

There is always a terrible danger attending professional life, namely, that of falling into a groove, and against this danger nothing can guard so well as a classical education. Every day we see, both in daily life and in our periodical literature, the lamentable results of the absence of some such safeguard. A man with no intelligent pursuits to enliven the monotony of practice, becomes dull even as a practitioner; if there is only one thing he can do properly, he will never do that one thing superlatively well; he may learn, with a certain amount of application, to build up cohesive fillings, but this is, after all, only a small part of dentistry.

The intelligent diagnosis of obscure sources of pain, and the judicious modification of routine treatment under the infinite variety of cases that will come under his notice, require a fine appreciative sense, and even when the source of trouble is detected and the remedy applied, there remains the other and more subtle department of the healing art to practice, namely, the judicious appreciation of the special requirements and peculiarities of the individual under treatment. No two cases are alike, and no two patients are alike either, and it is the tact and judgment which we bring to bear upon each case, far more than the mere manipulative dexterity or book-knowledge at our command, which will raise us above the level of our fellow practitioners and make us really great in our calling. To pick out from the many famous names of our day, we may instance Sir William Jenner and Sir Andrew Clark; these did not rise to what they are so much by pre-eminent knowledge of medicine, as by pre-eminent knowledge of human nature; for there were plenty of young men who started in practice at the same time, and with apparently equal chances of success. Granted that they were uncommonly gifted in every branch of their profession, that which raised them head and shoulders above their compeers was, if we may use a homely expression, their superlative *tact*. It is the greatest gift that a doctor can possess to be able to "minister to a mind deceased." Ills that are not real but imaginary require more able handling than a broken limb or a cut head.

Our mission is to *cure*, that is, to remove the mischief which afflicts our patient, and a little tact often goes further than a great deal of science in attaining this end.

To produce a race of surgeons who will view their *clientele* as a number of different living individuals, and not as a series of opportunities for mechanical demonstrations, we require a wide and liberal education. By all means let our young men cultivate the allied sciences, but first let them study to become thoughtful gentlemen, cultured and educated students of men and women, let them have tastes and pursuits outside their daily work, and the result will be that this daily work will be better done and the profession more highly esteemed by outsiders. We think, with Mr. Turner J. Smith that the proper commencement of the education aiming at such results is a classical basis, and we hope his words will bring forth fruit. It cannot be too strongly impressed upon those who are responsible for the form that modern professional education is to take, that scholarship, like music, cricket, swimming, and many other things, must be begun early ; it is impossible to graft such a bud upon a tree in riper years: the teaching that is to make a man a gentleman and a scholar must be begun in youth, and the time employed upon it will never be thrown away whatever the after career of the individual is destined to be.—*Journal of the British Dental Association.*

FORMATION OF CRYSTALS IN THE ORGANISM.

Dr. Galippe stated, at a recent meeting of the Biological Society of Paris, that the existing theories for explaining the formation of crystals in the animal organism are not satisfactory, though he believes that micro-organisms have some influence on the formation of these salts. From researches made with dental tartar, Dr. Galippe has discovered that it always contains micro-organisms, which, when sown and cultivated, are constantly attended with identical results. He concludes that probably these micro-organisms are factors in the formation of salivary calculi. In the centre of these calculi there is always some foreign body, such as a hair or a fish-bone. He does not believe that the foreign body is a centre of crystallization, but that micro-organisms are carried along with it into the salivary canal ; there, by chemical action, they become agents in the formation of a deposit or mineral salt ; hence the necessity for rinsing the mouth frequently, and particularly after meals, with an alkaline solution. Dr. Galippe also met with micro-organisms in biliary and vesical calculi.

PIN-HOLE CAVITIES AND "CARIES INTERNA."

In practice we not uncommonly meet with cases where a very small opening through the enamel is the only external indication of a very large cavity in the dentine, and even when the enamel is apparently not yet broken through, we may find, on cutting into it, a cavity already forming, or at least a considerable softening in the dentine, giving rise to what I think has often been mistaken for "caries interna." We frequently ask ourselves the question : Can the small particles of food which may enter through so minute an opening bring about so extensive a decalcification ? Recent observations have rather inclined me to the view that it must, or at least may, be so.

In explanation of the first case, I have seen the same appearance exactly in pulpless teeth, and have produced it artificially. I have a second temporary molar which was exposed for seven months in a fermenting solution. It shows three pin-holes on the grinding surface, one of them extending nearly to the pulp and undermining the enamel in all directions. Here there was nothing present to produce the effect described, excepting the chemico-parasitic factors.

In explanation of the second case, I have observed that acids may work their way through enamel in sufficient quantity to produce a softening of of the underlying dentine, without completely breaking down the enamel, or revealing a cavity to the naked eye or a blunt instrument.

I have specimens in which the dentine is infiltrated with micro-organisms and beginning to dissolve, while the enamel covering is still not completely disintegrated. In all cases of this nature interglobular spaces naturally play a very great role. In teeth of very inferior structures the dentine is in some places a mere framework, which is quickly softened, even by very weak acids. It must, furthermore, be borne in mind that in mastication food is subjected to considerable pressure, by which it may be forced through the smallest cracks and openings. We have all seen how particles of food may find their way to the very apex of a root canal which we have under treatment, if we allow it to remain open for a day.—Miller, *in Independent Practitioner.*

WINTER-TIRE.

It is a curious fact that the farther north we travel the hotter habitually are the interiors of the houses. At first thought it would seem natural that the temperature in which the person lives in the house should approach more closely that of the external air, but a little consideration shows the reasonableness of the habitual action of northern nations. The man who is exposed all day to a low temperature must produce an enormous amount of caloric in order to meet the demand and keep his body warm. At eventide he naturally seeks rest, not only for wearied mind and muscle, but also for the heat-producing function. It is not always remembered that energy is expended in maintaining bodily temperature, and that when an excessive amount of such energy is required, excessive exhaustion follows. The habitual excessive draught of the winter-time upon heat production is probably one of the reasons that in the early spring every one feels so relaxed and depressed. Of course, the general relaxation and lack of energy which has received the popular name of spring fever, and which is supposed by many to be moral rather than physical, is due in part to the fact that the winter is, at least to many brain-workers and denizens of cities, the period of excessive toil. Nevertheless, it should be called winter-tire rather than spring-fever.

This relaxation of the system shows itself not only by the production of laziness, but also in manifestations of distinct disease. A good deal has been written in the course of the last decade concerning the fact that in children chorea is much more frequent in the spring than at other times, but our own experience is that in this respect chorea does not stand alone among nervous diseases. Neurasthenic conditions, hysteria, and all the minor or functional nervous ills which are connected with lowered nerve tone have come under our notice as a regular spring crop, and we think most neurologists will find that the months of April and May are those of greatest professional activity.—*Therapeutic Gazette.*

CONDUCTOR'S DEPARTMENT.

NEW YORK STATE SOCIETY—THE COMING MEETING.

The coming meeting is a long way off, (May, '87,) nevertheless we are in possession of information in regard to it that will interest its membership, and perhaps many outside who may think it profitable to put Albany on their visiting list. Ordinarily little or nothing is done towards perfecting arrangements for a dental meeting, large or small, until a short time before the event, and then matters are so hurried that disappointment only comes to those in charge and attendance. That this is not likely to be the case with the meeting and managers in question, is evidenced by the fact that the several essayists are already engaged, the committeemen all at work, and several schemes under consideration, any one of which will add materially to the interest of the occasion.

Heretofore little outside talent has appeared at Albany, the papers coming with few exceptions from the Society's own members, permanent or delegate. This time, however, home effort will be the exception, the time being taken up almost wholly by dental practitioners of other societies and States. To particularize—Prof. E. T. Darby, of Philadelphia, will present a paper; also Prof. R. R. Andrews, of Cambridge. Drs. J. L. Williams and G. W. Weld will each present a paper on a subject of his own choosing. Then we are to have a digest of dental law by a rising young lawyer of New York city—a digest not only of the laws of the several States, but of the whole civilized world—every nation in whose laws dentistry has found mention. We are also to have a "Symposium." Four gentlemen have already been named, and it is just possible that two or three more may be added in the near future.

The business of the meeting will be thoroughly boiled down, and disposed of the first hours of the first session, leaving the remainder of the time, except that necessarily consumed towards the end of the meeting by "miscellaneous" affairs, for essays and their discussion.

Our readers will see from this outline that the next meeting of the State Society will prove of unusual interest,and well worth going a long way to attend. That the attendance will be large no one has reason to doubt.

The new administration starts in early and well.

THE STATE SOCIETY AND THE BALTIMORE AND NEW YORK COLLEGES.

Some years since, the Baltimore College of Dental Surgery offered to take annually a student endorsed by the State Society, and at half the usual fees. Several young men have gone through this old institution in this way creditably to themselves, the College, and the Society that endorsed them. Now we learn that Prof. Winder, when requested to do better than this, agreed to remit annually the whole of the tuition fees to any student recommended by the State Society. And Prof. Frank Abbott,of the New York College of Dentistry has agreed to the same thing in behalf of the institution that he so ably represents. Heretofore it has been remarkably easy for a young man to become a benificiary, but hereafter he will find it necessary to earn this distinction. By this we mean that it is more than likely that he will be obliged to appear before the Board of Censors for examination, not as to his qualifications to practice dentistry, but as to his qualifications to enter upon the study of dentistry. Those who pass this ordeal will represent the Society in the institutions named, and as the Society necessarily vouches for them it proposes to know beforehand what manner of men they are, hence the proposed examination by the Board of Censors. The Society has had no opportunity for action in the matter as yet, but will have at the coming meeting, when details will be presented by President Kingsley, whose efforts in hehalf of the Society have resulted as herein related.

SERIES OF ILLUSTRATED PAPERS.

In the January number of the ODONTOGRAPHIC JOURNAL will be begun "A Course in Animal Histology," largely elementary, but with a bibliography for advanced work. Methods will receive considerable attention. A feature of the papers will be the attention paid to the embryonal origin and development of the several tissues and organs. The illustrations will be largely original. Further particulars as to the author of the papers, and his position as an instructor in animal histology, will be offered at the proper time.

OUR LEADING ARTICLES.

The leading articles of this number are from the manuscript of the famous "Lost Transactions," and now appear in print for the first time. They are by representative men, and deserve not only careful reading, but in some of their parts thoughtful study.

DIED.

We have just learned of the death of the venerable Dr. S. B. Straw, father of Dr. L. S. Straw, of Newburgh. Time, age, and other particulars are not at hand, hence this too brief notice of the close of a long and honorable career.

PELLETS.

"Eat, drink and be merry, and to-morrow take a bilious pill."

Never forget to use a little vinegar after dropping carbolic acid in the wrong place.

Salt water only should be used on raw surfaces. It is also an excellent solvent of ropy saliva.

"Incurable diseases a specialty," reads an M. D.'s sign at the home of the *Indiana Pharmacist.*

Dentistry is represented in the Faculty of Physic, University of Maryland, by Drs. F. J. S. Gorgas and Jas. H. Harris.

There's long-facedness in the Rochester Dental Club. Dr. J. H. Beebe is no longer one of us. He's two—or will be when he returns from his wedding trip.

For "(g g. 13 per cent.)" on page 137, fourth line from the top, read, "(99. 13 per cent.)" The compositor worked it over twice and even then made gim-gams of it. He's better now.

The Philadelphia Dental College will remove to its new quarters in July, '87. Its enterprising and hard-working dean will have things to suit him if the removal is delayed even longer.

Dr. J. R. Knapp, of New Orleans, deserved all the praise bestowed upon him by those who saw and appreciated his remarkable achievements in the production of crowns and bridge-work.

The September *Dental Cosmos* contains the advertisements of sixteen dental schools, and more to be heard from. Some of these days we'll have a school each, and then perhaps we'll become professors.

E. H. Sargent & Co., of 125 State Street, Chicago, made a small but choice display of imported and domestic drugs and chemicals at the Niagara meeting. Merck, Schuchardt and other German laboratories were fully represented.

At a regular meeting of the New York Odontological Society, held October 12th, Dr. William J. Younger, of San Francisco, addressed the Society upon "Implantation of Teeth," and Dr. J. Morgan Howe related his personal experience in "The Regulation of Teeth." Of course "The Herbst Method" came up for discussion.

"Dr. V. Gsell-Feltz, of St. Gallen, warmly recommends, in toothache rrom dental caries, the application of cotton-wool soaked in an oily fluid obtained by melting together five grammes of camphor, five grammes of chloral, and one gramme of cocaine. Relief is complete and lasting." This is medical, therefore good.

Dr. Atkinson says, "In cleansing teeth one must be not only thoroughly religious, but also in bloody earnest."

"The molecules of my mesentery tremble when I hear men talk of effecting cures of pyorrhœa alveolaris by simple laceration." Dr. Atkinson says that, too. Translated into the language of an empty belly, it means his bowels "yearns."

The Pacific Record of Medicine and Pharmacy copies a racy article from the *New York Star*, detailing the marvelous results attained with a new anæsthetic by "a little bald-headed dentist, who lives in Brooklyn." That word "bald-headed gives the "snap" away, for there are no bald-headed dentists in Brooklyn. The bears —Let's see, what did the bears do with them?

Mr. Geo. W. Rafter, whose valuable paper on "The Sanitary Value of Potable Water," appeared in our July issue, is a skilled photo-micrographer. Out of his own necessities has grown a photo-micro-camera that is truly professional in all its details, and that shows up by comparison the toy-character of all previous attempts in this line to meet the traditional long felt want.

Mr. Chas. E. Alling, of this city, has perfected and published a work which commends itself to microscopists who desire to keep for reference a permanent record of their work. It is modeled after a plan suggested by Prof. S. H. Gage, of Cornell University, at the Chicago meeting of the American Society of Microscopists, and modified to meet the wants of the general worker as well as the specialist. A postal as above will obtain for examination a specimen page of the book.

Here's another one. He made a big speech at the last State meeting and now dodges the responsibility. Hear him: "If I said what the reporter has made out, and in such a way, I'll never 'speak in *meetin'* again, but go to a woman's school for another quarter." Sh! ——"Does that come from 'Dont?'"

Dr. S. G. Perry says:—"It is my firm conviction that there is to-day no sin so great in dental practice as that of disturbing in any way the natural shape of the teeth. * * * Rather than cut the approximate surfaces, I would let them decay, and then fill the cavities resulting, so that their natural shape shall be preserved and the teeth prevented from moving in their sockets."

Dr. E. Parmly Brown cuts cavities in porcelain teeth by means of small corundum wheels; Dr. E. M. Flagg uses a diamond; Dr. C. F. W. Bodecker uses corundum wheels, also old steel burs kept moist with turpentine saturated with camphor; the bur is kept in good condition and the operation facilitated by causing it to turn slowly a few times in one direction and then in the opposite.

Dr. Chas. F. Ives writes us as follows: "I saw in the July ODONTOGRAPHIC, a notice of the screw with wood cut thread, credited to *me*. It belongs to Dr. J. Morgan Howe, and * * * I am going to ask if you will kindly make the correction in the October issue. I'll send you a good, long piece for your trouble when I get home."

We make the correction most gladly. But stay! Wonder if the doctor's got home.

The JOURNAL for July was somewhat behind, and in consequence of hurry in final make-up, a few errors in proof crept in. In Mr. Rafter's paper on the "Use of the Microscope in Determining the Sanitary Value of Potable Water," etc., are a few such. The matter was put to press without a final revision, in consequence of which the foot-note references (asterisks *, daggers †, and double daggers ‡) stand in the printed matter the same as they appeared in the original manuscript, the paging of which did not agree with the paging of the printed matter. On page 16, for instance, this brings three asterisks (*) where there should have been astetisk (*), dagger (†) and double dagger (‡).

Our readers will please make these corrections, together with a few other unimportant errors of proof.

Dr. Henry Wile, Atlanta, Ga., while he may be a very good surgeon has gotten himself into trouble by transplanting the skin from the forearm of a boy to the scalp of a girl cousin. The scalp had been burned, leaving an open sore. The boy's father had not been consulted, hence the trouble. The father's indignation was so great that he had the doctor arrested for assault and battery. Dr. Wile gave a $200 bond for his appearance, and the hearing of the case will excite no little interest.—*Archives of Dentistry.*

Dr. Wile (also Professor) is an old Rochester boy, and may be trusted to take care of himself.

THE EIGHTEENTH

Annual Convention of the Seventh and Eighth District Dental Societies, in conjunction with the Fifth and Sixth, will be held in Rochester, Tuesday and Wednesday, October 26th and 27th, at the New Osburn House. The programme is as follows:

Treatment of Cleft Palate—Dr. Norman W. Kingsley, New York. A Suggestion—Dr. Frank B. Darby, Elmira. Experiments in Vulcanizing—Dr. G. B. Snow, Buffalo. Laboratory Hints—Dr. J. H. Beebe, Rochester. Oral and Clinical Demonstrations of Methods Involved in Crown and Bridge Work—Dr. G. W. Melotte, Ithaca. The Relation of Dentistry to Medicine—Dr. C. T. Howard, Rochester. Reminisences and Incidents of Dental Practice—Dr. L. W. Bristol, Lockport. A Case in Practice—Dr. F. E. Howard, Buffalo. Irregularities of the Teeth—Dr. A. R. Cooke, Syracuse. Discriminate Use of Gold in Filling Teeth—Dr. S. B. Palmer, Syracuse.

Dr. Norman W. Kingsley, President of the Dental Society of the State of New York, will address the meeting on Tuesday evening, giving his treatment of Cleft Palate. His reputation and success in his special modes of treatment, will make his address an interesting feature of the meeting.

Attention is called to the fact that the meeting is to be held at the New Osburn House. It being one of our first-class hotels, and the Committee having secured the rate of $2.00 per day for all attending the convention, request that all will make it their headquarters during during their stay, as it will be more pleasant and facilitate business.

Everything possible has been done by the Business Committee to make this one of the best meetings ever held by this Society. The arrangements have all been made by the following, the bulk of the labor falling necessarially to Drs. French and Saunders of the Seventh:

FRANK FRENCH,
BOYD G. SAUNDERS,
C. W. STAINTON,
B. RATHBUN,
Business Committee.

FOUR IN ONE—BIG MEETING.

There will be held in Rochester, October 26th and 27th, a joint convention of the Fifth, Sixth, Seventh and Eighth District Dental Societies of this State. This includes one-half of the districts of the State. Prominent members of the profession will be present, clinics will be given, and papers on practical subjects will be read and discussed. Members of the profession are invited to be present. Those who attend will improve a rare oppertunity, while those who stay away will have much to regret. Note the date in your appointment-book, and be prepared to come.

CHAS. T. HOWARD,
Rec. Sec. VIIth Dist. Den. Soc.
Rochester, N. Y.

BOOKS, PAMPHLETS, ETC.

THE AMERICAN SYSTEM OF DENTISTFY—IN TREATISES BY VARIOUS AUTHORS. Edited by WILBUR F. LITCH, M. D., D. D. S. Philadelphia: Lee Brothers & Co. Pp. 1,034.

This volume, the first of three comprising the "American System of Dentistry," will prove most welcome to the dental profession, coming as it does from well-known and representative men in the several special subjects of which it treats. The work was projected some years since, but beyond the few more or less concerned in its preparation, little was known of the progress that had been made, until canvassers presented the subscription book for orders a little more than three months ago, when the volume before us was promised in the early autumn. According to promise, subscribers received it on time, and ere this have doubtless gone over, at least in a cursory way, its varied contents.

It treats comprehensively and in detail of Regional and Comparative Anatomy, Dental Histology, and Dental Pathology, sub-divided as follows: Regional Anatomy, etc., by Dr. M. H. Cryer, of the Medico-Chirurgical College, Philadelphia; Lymphatic Vessels of the Head and Neck, by Dr. A. P. Brubaker, of the Pennsylvania College of Dental Surgery and Jefferson Medical College; The Teeth of the Invertebrates, by Mr. W. H. Dall, of the National Museum, Washington; The Teeth of the Vertebrates, by Dr. J. L. Wortman, Army Medical Museum, Washington; Embryology and Dental Histology, by Dr. W. X. Suddoth, of the Philadelphia Dental College; General Pathology, Dental Caries, Pathology of the Dental Pulp, Diseases of the Peridental Membrane, and Abrasion and Erosion of the Teeth, by Dr. G. V. Black, of the Chicago College of Dental Surgery; and Diseases of the Dental Pulp and their Treatment, by Dr. Jas. Truman, of the University of Pennsylvania. These contributions seem to cover the ground pretty thoroughly, and with the five hundred and thirty-seven illustrations and six plates, many of them especially prepared for this work, place the student in possession of all that is essential to a thorough understanding of regional anatomy and dental histology and pathology.

The work of the publishers is handsomely and substantially done, paper, press-work and binding (three styles) being all that anyone could desire.

We bespeak for the work an extended sale, which it most certainly deserves, and hope that in this case at least it will not be possible for those who have put the "American System of Dentistry" on the market to endorse the verdict of a certain other publisher of dental books, that "Dentists are not reading men."

A Practical Treatise on Mechanical Dentistry, by Joseph Richardson, M. D., D. D. S. Fourth edition, revised and enlarged, with four hundred and fifty-eight illustrations. Philadelphia: P. Blakiston, Son & Co. Pp. 710.

This standard work has now been before the dental profession twenty-six years, and has improved with each edition, until to-day it stands without a rival in the special department of which it treats.

The second edition was a great improvement on the first, and the third on the second; but the changes in the fourth have been so thorough and numerous that it comes out not only improved but almost a new work.

The author says: "Noting carefully the imperfections that revealed themselves on a studious and painstaking review of former editions, the necessity of a thorough revision of the whole body of the original text became apparent. and though this involved extended research and much labor, neither have been spared in the effort to render the present revised edition as faithful an exponent as possible of the best thought of the profession concerning the subject matter of which it treats." Also, "It would be impracticable to particularize the emendatlons and supplemental matters incorporated in this edition, since they permeate almost the entire body of the original matter contributed by the author."

One portion of the wcrk will prove particularly valuable and interesting at this time, and that is the lengthy chapter devoted to crown and bridge work. It is undoubtedly the best and most completely illustrated description of crowns and bridges, and their application, to be had in book form.

INDEX TO THE PERIODICAL LITERATURE OF DENTAL SCIENCE AND ART, as Presented in the English Language. By J. TAFT, M. D., D. D. S. Philadelphia: P. Blackiston, Son & Co. Pp. 212.

In the preparation of this Index, Prof. Taft has done the student and practitioner a valuable service It presents a reference to the principle papers which have appeared in dental periodical literature in the English language, on every subject interesting to the profession; also a complete reference to dental periodicals, and a very good index to authors of papers on dental subjects. Its use will enable one to get at what he wants without unnecessary trouble and loss of time.

THE

Odontographic Journal.

VOLUME VII.—*January, 1887.*—*No. 4.*

A COURSE IN ANIMAL HISTOLOGY.

BY THOMAS G. LEE, M. D.,

Lecturer on Normal Histology, Medical Department Yale University.

Microscopic anatomy has made wonderful advances in the last few years. New apparatus has been devised, new methods perfected; by these means results have been obtained which were impossible under the methods of the older workers. As a consequence of this the literature of the subject has increased very considerably, and as much of it is not easily accessible to the majority of readers, we have endeavored in the following pages to give a resumé of the most important of modern methods of work, with a consideration of the preparation and the principal points of structure of the various tissues and organs of the body. Some reference will be made to their embryological origin.

These articles are intended to guide the beginner working by himself, and the formulæ and Bibliography, it is hoped, will assist the more advanced student in his studies.

We are very much indebted to the authors of the various books and papers mentioned, in the lists given here, for much of the matter contained in these pages.

NOTE—Fullfaced figures in parentheses refer to the various paragraphs in the articles. Light faced figures to the Bibliographical list.

PART I.

1. Apparatus—Microscope.—The stand need not be expensive, but should be well made, and to commence with, an outfit of two eye pieces, say A. and C., two objectives, a 1 inch or 3-4 inch for a low power, and the other a 1-4 or 1-5 inch, a camera lucida for drawing, and an eyepiece micrometer will do nicely. Other articles can be added from time to time, as a higher power objective and sub-stage, condenser, etc.

A complete description of the microscope and apparatus, and their manipulation would occupy too much space, and the reader is referred to the many excellent works on the subject,—as Carpenter, etc. (See Biliography.)

2. Microtome.—Some form of microtome is essential to the production of the best results in this work. The simpler form of instrument consists of a brass cylinder, containing a plug, which is moved upwards by means of a screw with a fine thread. At the top of the tube is a broad, smooth metal plate, on which the knife rests in cutting the sections. This form is modified for freezing, by surrounding this tube with a copper box, in which we place a freezing mixture. In this form of microtome the knife is free, and the sections are not always uniform in thickness.

The modern microtome is made with the knife fixed firmly to a carrier, which moves smoothly in a groove, while the imbedded object is raised to the knife either by means of a vertical screw, or up an inclined plane by a screw.

The Schanze and Thoma microtomes are types of these two forms respectively. These have freezing attachments to them, so that sections can be cut in that manner if desired. They cut very evenly, and sections of well-prepared tissue can be cut as fine as 1-5000 of an inch. On embryological work German workers claim to cut 1-12000 of an inch. (See Sectioning.)

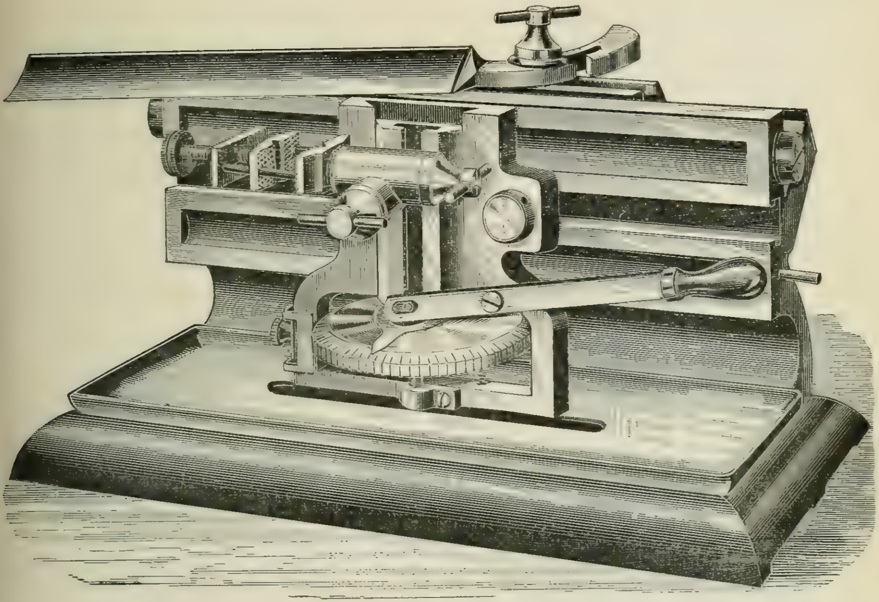

Fig. 1.

The Schanze model is seen in Fig. 1, which represents an excellent instrument made by the Bausch & Lomb Optical Co.

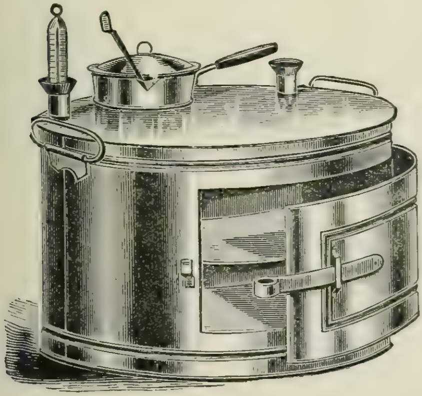

Fig. 2.

3. Water Bath. — In cutting with the paraffine method, which in many respects is superior to the others, a water bath is needed. It consists of a double copper box, containing water, and either the oven inside is used, or there may be little wells of various sizes let in the top, or these may be combined. (See Fig. 2.)

The air chamber has a thermometer connected with it. Both may be heated with a thermostat gas regulator, or over a lamp, or stove, if the temperature is watched carefully. They can be procured from microscope makers, or the little ovens made for chemical work may be made to answer. For cheaper ones the tinner can construct one to order.

The following is a very useful form and very cheap. It consists simply of a tin dinner pail—largest size—mounted on wire legs, at such height as will best accommodate a small Bunsen gas burner, a thermostat and a thermometer. The cover is cut in two pieces, one of which is soldered to the inner or oven part of the pail, the other used merely as a lid. The first part is perforated in two or more places to accommodate thermostat, test-tubes, etc., and has just beneath it, midway between the top and bottom of the oven, a shelf of tin, similarly perforated, through which the above articles pass and are rendered steady. Two dollars ought to cover the cost of the whole apparatus. The thermostat may be made at home, or better, perhaps, purchased of the janitor of Johns Hopkins University, Baltimore. His charge is fifty cents, plus transportation charges. (For the use of the water bath see articles on Imbedding and Sectioning.)

4. **Injecting Apparatus.**—Some form of apparatus with which to inject the tissues of the body, is important, and is readily made. A simple pressure metal syringe, with various cannulae, may be used, but some form of pressure apparatus is better. These consist of an air chamber, the condensing apparatus, and some Woulff's bottles to contain the injecting fluid.

The air chamber consists of a wide mouth bottle with a tightly fitting rubber stopper, which is pierced with four holes. Through two of these pass glass tubes, which are bent at right angles, and connect by rubber tubes with the Woulff's bottle. Of the other holes, one connects with the manometer, the other with the pressure bottle.

The manometer is a U-shaped glass tube, partially filled with mercury, by which the amount of pressure is estimated.

The condensing apparatus varies; in some forms the pressure bottle is connected with a tap of running water, others get the pressure by means of two bottles; one containing water or mercury is raised by means of a pully, the height determining the pressure, or the third form, which we would recommend above all the others,—is where the pressure is obtained by forcing water into the pressure bottle by means of a rubber bulb with two valves. This form consists of an aspirator bottle preferably (any bottle will do however), the upper rubber stopper fitted with two glass tubes, one connecting by rubber tubes with the air chamber, the other with the rubber bulb, which is an ordinary syringe bulb. The lower neck of the aspirator bottle has a tube by which the water can be returned to the water supply-dish. The joints must be tight, at the places, where the rubber tubes fit the glass. The rubber tubes are supplied with pinch cocks where needed. The advantages are that it does not cost as much, takes up less space and every thing is within reach, and any degree of pressure can be maintained far more easily and accurately than with any other form. (The process of injecting will be considered later).

5. **Slides of clear, thin glass, 3x1 inch**—Covers, No. 1, ¾ inch, glass and a few No. 1 ⅞ in., and a bottle of benzole balsam are needed in mounting; needles fitted in holders, a pair of delicate forceps and fine-pointed scissors also are required. Other articles that are needed will be mentioned in their proper places.

6. **Methods.**—The wonderful advances in Histology in the last five or six years have been almost entirely due to the careful attention which has been paid to methods of investigation; and it is only by exercising the greatest care in manipulation that accurate and reliable results may be expected.

The tissues with which to work are obtained as far as possible from the living animal, and pass through the various stages of killing, fixing and hardening; dehydration, cleaning, imbedding and sectioning. The sections require to be fastened upon the slide, stained and finally mounted.

The following are some of the most reliable methods of performing these various steps taken from the best authorities on these

7. **Killing and Fixing** —The object in view here is to preserve the elements of a tissue in a condition as closely resembling that in the living body as possible, for this purpose we have resource to reagents which act on the potoplasm of the cells almost instantaneously, *fixing* them either by a chemical combination with the protoplasm or by a coagulating action.

For some animals, however, there are used solutions which kill more slowly. This is to cause them to die in an extended condition, not to be obtained in the other manner of fixing, e. g., certain marine worms. These fluids should be such as do not cause the tissue to become brittle, prevent their subsequent staining, or abstract the water too quickly.

8. Osmic Acid.—Osmic acid is used either in the form of vapor or solution. It comes in small glass capsules each containing one gram. To prepare:—clean the capsule thoroughly; place in a clean amber glass bottle containing 100 c. c. distilled water; break the capsule with a glass rod, and carefully protect the bottle from the the light and dust, as the acid is very susceptible to organic matter and light. From this 1 per cent. solution any dilution can readily be obtained. This fluid is used for a great variety of tissues. The following from Lee's "Mic.Vade Mecum" will show the various strengths and time of immersion. For Infusoria 1-2 per cent. a few seconds. Sponges, 1-20—1-10 per cent., some two hours. Molusca 1-2 per cent., twenty-four hours. Meroblastic ova, 1-10 per cent., twenty-four hours. Epethelia, 1-10—1-2 per cent., one to two hours. Medulated nerve, 1-10—1 per cent., twenty minutes to two hours. Tactile corpuscles, 1-3—1 per cent., twenty four hours. Retina, 1-4—2 per cent., ten minutes to twenty-four hours. Nuclea, 1-10—2 per cent., two to three hours. Objects when in the solution must be protected from the light.

The vapor is used by suspending the bit of tissue in a wide-mouth bottle containing some crystals or a 1 per cent solution ; it is more penetrating than the liquid—takes stains more evenly, and does not need washing before staining.

After staining in the solution great care must be observed in thoroughly washing it out before staining the tissue, if over stained it must be washed in ammonia carmine, or picro carmine, or soak for twenty-four hours in Müller's fluid, Merkel's solution, or a 5 per cent. solution of chromic acid, or a weak solution of the cyanide, or ferrocyanide of potassium. (See also Bleaching).

The vapor is very irritating to the respiratory tract. Osmic acid blackens the medulary sheath of nerves, and fat, so as a staining agent it is best followed by picro-carmine. (See Staining).

9. Chromic Acid.—Solutions of chromic acid in water or alcohol alone or mixed with other reagents, is much used in fixing, hardening, also in decalcifing. Chromic acid crystals rapidly deliquesce on exposure to the air, so the whole contents of a bottle should be used at a time when it is opened. Best kept in a stock solution of 1 per cent. chromic acid, and solutions containing it or any of the chromates, should be kept in the dark, in fact all preparations that are being hardened are better when kept from the light, as thus is prevented a precipitate which would otherwise occur. Use solutions of 1-10 to 1 per cent. for a few hours; wash thoroughly in running water for some hours as otherwise staining is difficult. Safranine and Hæmatoxylon are the best stains after chromic acid. This acid is used more largely in combination with other acids and alcohol.

10. **Picric Acid.**—This acid is also used alone and in combination, for purposes of fixing, hardening and decalcifiing. It is most largely used in the form of a saturated solution. Time required varies from a few minutes to twenty-four hours, according to thickness; Infusoria one to three minutes being sufficient. The tissues are stained yellow by this acid. But it may be entirely removed by prolonged soaking in alcohol.

In washing tissues after picric acid, never use water, as it is injurious to the object; use alcohol instead. Tissues stain readily after its removal with alcohol. Mayer's cochineal, alcoholic borax carmine, Kleinenberg's hæmatoxylon are among the best.

11. **Nitric Acid.**—This is one of the most useful of the fixing agents, valuable in study of cells and for embyological work. Solutions used vary from 3—50 per cent.; a 5 per cent. solution for thirty minutes is useful for all except very delicate objects; wash out acid with alcohol. Wolf and His use 10 per cent. solutions for chick embryos; Altman 3—3 1-2 per cent. solution for fifteen minutes to twenty-four hours, according to size. (See **12**). For Karyokinetic figures Flemming and Strasburger, use 40—50 per cent.; Engleman, uses 3—4 per cent. solution in vertebrate retina; for brain Rabl-Rukard uses 10 per cent.; Minot uses same per cent. for fœtal brain.

12. **Dilute Nitric Acid.**—Altman uses 3—3 1-2 per cent. solution (sp. gr. 1.02). The fresh specimen or embryo is put in this fluid, which is kept cold; use only small pieces; wash and finish, hardening in alcohol; stain in haematoxylon before imbedding. This gives good nuclear figures.

Nitric acid is also used in combination for fixing and decalcifiing. Stains act very well as the acid can be all washed out.

13. **Acetic Acid.**—Use in solution 1—2 per cent., made from the pure glacial acetic acid. It does not preserve tissues, but render

them transparent; good in studying opaque ova, etc; has been used by Kölliker and Frey for tracing nerves and their terminations, as follows:

Glacial acetic acid,	1—2 drops.
Water,	100 c. c.

Used also in

COMBINATIONS:

14. Chrom-osmic Mixture.—(*Max Fleish's* formula.)

Osmic acid	.10 part.
Chromic acid	.25 part.
Water	100.00 parts.

Used in the preparation of vertebrate auditory organs, and also for other objects. Can be kept in light. Leave object in solution twenty-four to thirty-six hours. Does not blacken the tissue, but renders staining difficult. Good for nuclei, but Flemming found No. **15** better for auditory organs. Put fresh specimen in the mixture twenty-four to thirty-six hours. For larger specimens, to complete decalcification 1-4—1-2 per cent. chromic acid is added. Small objects, like mouse's temporal do not require the chromic. This mixture used for growing epiphyses, glands, retina, conjunctiva, cornea, eyelids, etc.

15. Chrom-acetic Acid.—(*Flemming.*)

Chromic acid	.2 to .25 per cent.	in water.
Glacial Acetic acid	1 per cent.	

Stain in hæmatoxylon. Gives good nuclear figures. Anilins do do not work with this mixture.

16. Chrom-acetic-osmic Acid—(*Flemming.*)

Chromic acid	.25 per cent.	in water.
Osmic acid	.1 per cent.	
Glacial-acetic acid	.1 per cent.	

17. Chrom-Platinum Mixture.—(*Merkel's* fluid.)

Platinum Chloride (aqueous solution)	1—400.
Chromic acid (aqueous solution)	1—400.

of each equal parts. For retina leave three to four days in the fluid. Whitman finds one hour sufficient for leeches; used also for ova; wash out in alcohol; objects stain fairly well.

18. **Chrom-nitric Acid Mixture.**—(*Pering's* fluid.)

Nitric acid (ten per cent. sol.)	4 parts.
Ninety per cent. alcohol	3 parts.
Chromic acid (1-2 per cent. sol.	3 parts.

This soon gives a violet-colored fluid; useful especially for ova and embryos; kills instantly; causes little or no shrinking and ova cut like cartilage; nuclei are well fixed; leave objects in the fluid four to six hours; then in 70 per cent alcohol twenty-four hours.

Staining fluids can be mixed with this fixing solution, so that specimens can be fixed and stained at the same time. Fuchsin and analine red may be added directly to the fluid, while eosine, aniline, violet, purpurin, etc. are first dissolved in three parts alcohol.

Picro-carmine and borax carmine give a precipitate, which must be filtered out. After staining, pass through 50 per cent. alcohol, five hours,—90 per cent. ten hours, then absolute alcohol.

18. **Picro-sulphuric Acid Mixture.**—(Kleinenberg's formula.)

Picric acid (sat. sol, in distilled water)	100 parts.
Sulphuric acid (concentrated)	2 parts.

Filter out the precipitate, and of the filtrate take one part, water three parts, kreasote as much as will mix.

Objects remain in this fluid three to four hours; then 70 per cent. alcohol five or six hours; then 90 per cent., which is changed repeatedly till the yellow color disappears.

Mayer uses the same formula, but omits the creasote as useless. More useful for invertebrates than for vertebrate tissues, as it is liable to swell the connective tissue. With objects containing carbonate of lime it forms gypsum crystals. For such objects use (No. **20**). With this fluid, as with picric acid, the acid must be washed out with alcohol and not with water.

20. **Picro-nitric Acid.**—(Mayer's formula.)

Water	100 parts.
Nitric acid (25 per cent.)	5 parts.
Picric acid, as much as will dissolve.	

The fluid is used undiluted. It is more difficult to remove from the tissues, but on the other hand it does not form gypsum crystals, nor is it apt to swell connective tissue. It should not be used for purposes of decalcification, as it forms CO^2 so rapidly as to mechanically injure the tissue.

21. Corrosive Sublimate.—(Mercuric bichloride.) This is an excellent fixative. Prepare a saturated solution in hot water; when cold it contains about 2 per cent. A 3-4 per cent. solution may be made, if desired, with 60 per cent. alcohol. It kills instantly; allows good staining, but objects should be imbedded soon, as if left too long in alcohol they become brittle; to use, place object in a cold aqueous solution; remove as soon as well penetrated with the fluid (ten to thirty minutes); wash well with distilled water to prevent the formation of crystals; then through 50 per cent., 70 per cent., 90 per cent, and lastly absolute alcohol.

The solution is used hot for some animals; this method especially adapted to marine worms, etc. In handling specimens in corrosive sublimate no iron or steel must be used; use wood, glass, quills, or platinum.

22.—The following are also used for fixing, etc.:

Palladium chloride aqueous solution, 1—300 water to 1—800 water, for one to two minutes.

Gold chloride is uncertain, but good if it acts—1-2 per cent. for ten to thirty minutes; wash out in water.

Silver nitrate—1-2 to 2 per cent. solution, a few minutes; boiling water, hot alcohol, acid alcohol, (70 per cent. to 90 per cent. alcohol 97 parts, hydrochloric acid 3 parts).

Iodine and other solutions are used for killing.

23. Hardening Fluids—It will be seen that most of the killing and fixing fluids have some hardening action, but usually the hardening has to be completed with something else. Alcohol is the thing most often used, but it should be at first of moderate strength, as 50 per cent. or less, and gradually increasing to 95 per cent., or absolute; again, the objects must not remain too long in the weaker alcohol, for fear of macerating.

Some hardening agents seem to act by coagulating the albumen, as nitric and picric acids; others, as chromic acid, the chrome salts, osmic acid and palladium chloride form chemical combinations with protoplasm. These last are not as readily removed from the tissues as the first named. Mercuric bichloride forms an exception, as it acts chemically, yet permits of ready staining.

The following include some of the most used hardening methods. In all large quantities of the fluid must be used, as compared with the bulk of tissue, and most of them require frequent changing.

Delicate objects may be placed in a bed of cotton wool; keep all solutions in a cool place and preferably in the dark. Each bottle should be labeled, as to tissue, dates, and time of changing. As these fluids are used dilute, it requires some time to harden them; this may be somewhat hastened by frequent change of the fluid.

24. **Chromic Acid.**—Solution 1-6 to 1-2 per cent. used; time varies; for brain it requires several weeks, while mucus membranes only a few days are sufficient; use large quantities of the fluid.

25. Chromic Acid and Alcohol.

Chromic acid (1-6 per cent. solution),	1 part.
Alcohol, 70 per cent.,	2 parts.

Allow to cool before using; change end of two days, again in a week, then place in alcohol.

26 **Bichromate of Ammonium.**—2 per cent. solution, acts slowly, several weeks are required.

27 **Bichromate of Potassium.**—2 per cent. solution, similar to the ammonium salt.

28. **Chromate of Ammonium.**—5 per cent. solution, keep in stoppered bottle; hardens quickly: use small pieces of tissue; mesentry, for example, hardens in twenty-four hours; kidney in forty-eight hours; wash thoroughly in water, finish in alcohol One of the best reagents for karyokinetic figures, and the rod epethelium of the renal tubules.

29. Muller's Fluid.

Potassium bichromate,	2 1-2	parts.
Sodium sulphate,	1	part.
Water,	100	parts.

To slower the chromic solution in action, but more penetrating, so larger pieces can be used. Useful for eye, nerve, artery, salivary gland, liver, skin, and other tissues spoken of under their appropriate headings.

30. Muller's Fluid and Alcohol.

Muller's fluid,	3 parts.
Alcohol,	1 part.

Prepare fresh; allow to cool; use large bulk; keep in dark. Good for eye, spinal cord, etc.; change at end of twenty-four hours, the third day and a week. The alcohol may each time be increased in strength, finally alcohol alone.

31. Elicki's Fluid.

Potassium bichromatic,	2 1-2 parts.
Cupric sulphate,	1-2 part.
Water,	100 parts.

This is similar to Muller's fluid, equal or better than it in its hardening properties; useful for brain, etc., renew fluid, often hardens brain in two weeks.

32. Palladium Chloride—(F. E. Schltze's formula). Make stock solution 1 per cent. in distilled water; keep in stoppered bottle in dark; fluid is of a dark brown color. Used in 1-8 to 1-10 per cent. solutions, which are pale yellow color; has great penetrating power for connective tissue; and objects containing but little of it must be in small cubes of not over a centimeter, as for certain nerves, brain, cord, etc. Hardens in one to three days, but tissue not injured by prolonged immersion, preserve structural details nicely; is a staining agent as well; stains protoplasm dark yellow, striated muscle brownish yellow; smooth muscle straw yellow; medulated nerve black. Connective tissue does not stain; gland cells, epethelia stain yellow. Tissues hardened in this fluid do not take stains readily.

33. Decalcification.—The various mineral acids are used for this purpose.

Hydrochloric Acid.—This acid is very much used; acts rapidiy even when diluted, but causes swelling. This is prevented by alcohol, chromic acid or salt. Waldeyer uses palladium chloride 1-1000 water to which add 1-10 its volume, HCl. Hydrochloric acid is also used in solution of 10 to 50 per cent.; this is very quick acting.

34. Hydrochloric acid and Sodium chloride.

Hydrochloric acid,	3 c. c.
Salt,	10 gm.
Water,	100 c. c.

This prevents the swelling caused by the acid alone; also valuable in showing the fibrous structure of bone matrix; add more acid from day to day; when flexible wash in water for some time; preserve bone in 10 per cent. salt solution and mount the sections in the same.

35. Nitric Acid.—Excellent; causes no swelling; acts promptly, at same time is preservative to the tissue; 1 to 10 per cent solution of c. p. acid sp. gr. 1.25 is used. The weaker solution for young [illegible]: first place specimen in alcohol for three days, then in the acid which is changed daily for a week; remove as soon as decalcified or they become yellow. Place in alcohol after *thorough* washing in running water.

36. **Chromic Acid.**—This may be used 1-10 to 1 per cent; takes two to three weeks; change fluid often; commence with weak solution and increase strength from day to day.

37. **Chrom-Nitric Acid.**

Chromic acid, (1-2 per cent. solution) -	100 c. c.
Strong nitric acid, - - - - -	1 c. c.

This is more active than the above, acts in one to two weeks; change fluid often; add more nitric acid from time to time; wash out well; place in alcohol. Bones become green in color, due to the chromium; sequioxide formed. This fluid acts in two ways, the chromic acid hardens, while the nitric decalcifies.

38. **Picric Acid.**—Used saturated solution; slow; good for fœtal bone.

39. **Glycerine Alum Carmine.**—These dissolve carbonate of lime and must not be used for mounting objects containing lime.

40. **Desilicification.**—Certain objects contain siliceous material, as sponges, to remove which we apply hydrofluoric acid; harden the object in alcohol and place in a lead or rubber dish; add the acid, a few drops at a time; objects require from a few hours to a day.

41. **Dissociating solutions.**—It is often very desirable to separate the structural elements of a tissue as thoroughly as possible, and this we accomplish by mechanical means or by macerating the object. Most of the killing or hardening fluids will act in this manner if weak aqueous solutions are used. Some of the fluids also destroy certain parts and preserve others. (See Corrosion and Digestion).

The macerating fluids either soften or destroy the cement substance so that the object can be easily separated. This is done by shaking in a test tube, with needles, or by tapping on the cover glass with the handle of the needles. This last is a most valuable method. (See Mounting.)

42. **Macerating fluids—Iodized serum.**-(*Ranvier.*) The amniotic fluids of mammals are the best serum; can be procured at slaughter houses, it must be fresh; add to it crystals of iodine. This dissolves

slowly, but iodides are formed later which help it in dissolving; filter. This is a stock solution and keeps permanently. To make solution, add some of the stock from day to day to fresh serum till you get a pale brown fluid. Very small bits of tissue are placed in 4 to 5 c. c. of this fluid in a covered dish for twenty-four- hours or longer. When the tissue is soft tease it out. The iodine tends to fix the protoplasm.

43. **Artificial iodized serum**—(Frey's formula).

Distilled water, - - - - -	135. gm.
White egg, - - - - - -	75. "
Sodium chloride, - - - -	2. "
Mix, filter, add	
Tincture iodine, - - - -	3. "

Filter again through flannel; not as reliable as **42**.

44, **Dilute Alcohol.**

Alcohol, (36 per cent.) - - - -	1 part.
Water, - - - - - - -	2 parts.

Epethelia macerate well in twenty-four hours; acts more rapidly than iodized serum; other strengths may be used; 1-2 per cent. and 1-4 per cent. for nerve fibers of retina.

45. **Dilute Chromic Acid.**—Solution 1 to 2 per cent.; very good for nerve tissue, as cells of spinal cord, and for muscle, smooth and striped; one to three days maceration;use 10 c. c. for cubes of five m. m. of tissue.

46. **Nitric Acid.**—Solution 20 per cent. for muscle, twenty-four hours immersion.

47. **Caustic Potash.**—Solution 40 per cent., or chlorate of potash 1 part to 4 parts of nitric acid; these are also good for muscle; takes twenty to thirty minutes. These caustic solutions used strong do not injure materially the cells, but *weak* solutions destroy all the elements; these specimens cannot be preserved permanently.

48. **Sulphuric Acid.**—Four to five drops acid to 30 c. c. water; macerate twenty-four hours; good for crystaline lens. Hot, strong sulphuric acid will dissociate horns, nails, hair.

Oxalic acid used strong for several days; used for nerve endings.

49. **Osmic Acid.**—1 per cent. a few minutes to two week's immersion for brain.

50. **Permanganate of Potassium.**—One per cent. solution good for cornea.

51. **Glycerine and Nitric Acid.**—One part acid to three parts water, and one part glycerine; immerce for three days; finish in water for nerve tissues and crystalline lens.

52. **Barium Hydrate—Sodium Chloride.**—Saturated solution of barium hydrate in water; tendon takes twenty-four hours; salt 10 per cent. solution dissolves the cement of white fibrous tissue; for fibres of bone matrix requires several days.

53. **Sulpho Cyanide of Ammonium and Potassium.**—Ten per cent. solution of either salt, macerate small pieces for one to four days; excellent for epithelium; causes crystalline fibre to become beaded. (Sterling.)

54. **Corrosion.**—All animal tissue is soon destroyed by eau de Javelle, yet fats which have been hardened by osmic acid will resist its action, so it is possible by impregnating a tissue with fat, hardening in osmic acid, and corroding with eau de Javelle, to get a mould of the spaces filled with the fat; olive or castor oil is used. There are two methods for this operation—injection and impregnation.

Injection.—Inject olive oil, and if the tissue is small and thin place at once in a 1 per cent. solution of osmic acid, but if thick, then cut sections with a freezing microtome, to prevent the loss of fat; then place in the osmic acid for twenty-four hours, then into the eau de Javelle; watch the object carefully, and when corroded sufficiently (a few minutes to several hours), take out directly into glycerine, or place on a slide with glycerine; can be mounted permanently.

Useful for eye, as the vessels of the choroid and iris—a frog for example. Inject from the aorta with olive oil; take out eye; place in osmic acid; after a time cut open and replace in acid; then dissect choroid or iris and corrode them; mount in glycerine ; good for interstitial injection of skin to show lymphatics. Method—Best place to show it is inner surface of hind leg of frog; cause an artificial vendeura in leg by a ligature, which retards venous but permits arterial circulation: two to three days are sufficient; remove ligature; pith the frog; cut off apex of ventricle and bleed thoroughly; tie one aorta; inject oil in the other; veins remaining untied. When pure oil comes out of open ventricle, then tie veins and continue the injection; then continue as above.

Also good for mesentery, which need not be corroded. (See also Injection.)

Impregnation.—The principle of this is, that by diffusion, fatty substances, if mixed with certain mediums will change places with the water of a tissue.

To one vol. olive oil add half a vol. absolute alcohol and the same of ether, (add ether till you get a clear mixture after shaking it). This fluid will take up small amounts of water, so if a small piece of tissue is immersed in it, there is dissolved and taken up in succession the water, fatty and nervous matter, these being replaced by the oil mixture; place the tissue in water and the oil is thrown down in the tissue; blacken with osmic acid and corrode.

Instead of the above formula, the following may be used:

Castor oil - - - - - -	2 parts.
Absolute alcohol - - - - -	1 part.

No ether is needed ln this mixture. Use only *fresh* tissue in *small* pieces; leave in oil five to eight days; then water; then twenty-four hours in osmic acid; corrode and mount in glycerine.—(Altman.)

55. **Digestion.**—Digestion as an aid in histological investigation, introduced by Sterling, is useful from the fact that certain tissues are more resisting than others. The artificial gastric or pancreatic juice may be used.

Gastric Digestion.

Pure Hydrochloric acid - - - -	1 c. c.
Water - - - - - - - -	500 c. c.
Pepsin - - - - - - -	1 gm.

Instead of pepsin a few drops of a glycerine extract of gastric mucous membrane may be used; keep mixture at 38° C. for two to three hours before using. Used for various tissues, as bone, nerve, skin.

Method for skin.—Stretch a piece a piece of skin over a smooth glass ring and fasten it; place in a quantity of the fluid (200 c. c.) at a temperature of 38° C. for from three to eight hours—time depending on the age and size of skin; after it is somewhat digested the bit is placed in water for twelve hours, in which it swells up and becomes very transparent; it may now be hardened and stained in the ordinary manner; the unhardened portions may be preserved in a 10 per cent. salt solution.

Pancreatic Digestion.

An aqueous or glycerine extract of pancreas may be used. Von. Wittichs' method may be used.

Chop up the pancreas of a dog, and dehydrate for twenty-four hours with absolute alcohol; remove the alcohol and substitute enough glycerine to cover the gland; allow to stand three weeks; forcibly press the gland in a bit of muslin to remove the glycerine; the glycerine is a solvent of the trypsin; to 1 c. c. of this glycerine add 19 c. c. of a 1 per cent solution of sodium carbonate; filter the turbid fluid, and a pale yellow liquid is obtained; the tissue is placed in this and the whole kept at a temperature of 40° C., in a water bath for several hours.

Used for various tissues. Sections of bone thus prepared are preserved in 10 per cent. salt solution.—(Sterling.)

56. Injection.—For the study of the blood vessels and lymphatics of tissues and organs, in their minute distribution, we fill them with a colored material, which at once renders them prominent. The vehicles for the color are various, thus there are used: glycerine, gelatine, collodion, fatty, resinous and albuminous masses, and watery solutions; the colors principally used are carmine and Berlin blue; gelatine is the most used vehicle, and as the solutions are not permanent Fol's emulsions are to be preferred.

57. Gelatine Emulsion.—Carmine.—(Fol.)—One kilogram of gelatine (kind used in photography), is soaked in water till soft; pour off the water and liquify over water bath; one litre of a concentrated solution of carmine in ammonia is added slowly, with constant stirring; allow to cool; cut in pieces, place in a piece of netting and squeeze with the hands under water; the emulsion comes out of the meshes in the form of threads, which are now washed in running water for several hours to remove excess of acid or ammonia. The strings are again remelted and poured out on pieces of paraffined paper and dried in the air; when dry the gelatine is separated and cut up in pieces and kept in a dry place, free from dust; to use soak the mass in water and melt over a water bath.

The water used for squeezing out the threads must be acidulated with 1 per cent. acetic acid, otherwise the carmine will be dissolved out.

To prepare the carmine solution, take a strong solution of ammonia, dilute with three to four volumes of water; add carmine to excess; filter and add to the gelatine.

58. Gelatine Emulsion.—Blue.—(*Fol.*)—(*a*) Add 120 c. c. of a cold saturated solution of sulphate of iron to 300 c. c. of melted gelatine.

(*b*) To 600 c. c. of the melted gelatine add first 240 c. c. of a saturated solution of oxalic acid, then 240 c. c. of a cold saturated solution of potassium ferricyanide, (red prussiate of potasium); add (*a*) to (*b*) slowly, while stirring constantly; heat for fifteen minutes; cool and wash; strain through muslin as above.

This mass must be dried without remelting, (as in **57**), because the mass does not readily melt without oxalic acid.

To use, swell up the mass in cold water and melt on water bath, adding enough oxalic acid to make a complete solution.

The above is a modification of Thuersch's formula.

59. Gelatine Emulsion.—Black.—(*Fol.*)—(*a*) Dissolve 140 gm. salt in 2,000 c. c. water; soak in this 500 gm. gelatine; melt on water bath.

(*b*) Dissole 300 gm. silver nitrate in 1,000 c. c. distilled water.

Add (*b*) to (*a*) slowly, while stirring; press into vermicelli as above and these are placed in the daylight in the following:

Cold sat. sol. potassium oxalate -	1,500 c. c.
Cold sat. sol. sulphate of iron - -	500 c. c.

This gives a black emulsion, which is washed, remelted, and dried on paraffined paper.

If solution (*a*) and (*b*) are each diluted with three to four times the amount of water stated above, a much finer grained emulsion is obtained.

60. Aqueous Injection Fluid.—Red.—(*Brücke*).—A concentrated solution of potassium ferrocyanide is injected in the artery until it flows from the veins unmixed with blood; allow excess to drain away; then throw in a concentrated solution of sulphate of copper (which is free from iron); after twenty-four hours the specimen may be prepared as desired.

An advantage of this is that in cold weather it is not necessary to use preservative liquids during the preparation of the specimens, as the injected liquids are powerful preservatives.

61. Ammonical Silver Nitrate Fluid.—(*Hoyer.*)—To a solution of nitrate of silver of known strength add ammonia until the precipitate is barely redissolved; then dilute the solution until it contains from .75 to .50 per cent. of silver nitrate; inject this solution.

62. Acidulated Glycerine Injecting Mass.—(*Beale.*)

Glycerine (c. p.)	2 fluid ounces.
Tinct. sesquechloride of iron	10 drops.
Ferrocyanide of potassium	3 grains.
Strong hydrochloric acid	3 drops.
Water	1 ounce.

Dissolve the ferro cyanide in 1-2 of the glycerine, the iron in the other; add the iron solution drop by drop to the first; then add the water and hydrochloric acid; two drachms of alcohol may be added to the mass. This keeps well, and is useful.

63. Natural Injection.—(*Robin*).—To make natural injecton of organs, throw the *fresh* object in

Water,	100 c. c.
Liquid perchloride of iron,	10 c. c.

64. Injection during life.—This has been used to inject ducts of glands—in a natural manner—as the bile ducts and uriniferous tubules.

Method for kidney: Allow a rabbit to lose 10 c. c. blood from the jugular vein, replace it with a filtered solution of carmine containing 2 drachms carmine and 1 drachm liquor ammonia to the ounce of water. A dog would require 25 c. c.. Immediately after the injection ligate the ureters; at the end of an hour kill the animal. Then inject the blood vessels with Prussian blue gelatin mass; place it again in alcohol, containing 1-2 drop glacial acetic acid. Before placing the kidneys in alcohol soak for a short time in a solution of potassium chloride. Instead of carmine, indigo carmine (sulphindigotate of soda) may be used; if so, then inject blood vessels with red gelatin; use a cold saturated solution of the indigo carmine in water.—(Klein).

65. Injection of Animals or Organs after death.—The animal selected should be killed with chloroform, and this may be mixed with nitrate of amyl or hypodermics of it given.—(Oviatt). The amyl causes a more complete relaxation of the non-striated muscles of the viscera. The whole animal may be injected, but it is better to inject organs separately and in doing so insert the canula in the artery of the part and tie the anastomosing vessels; leave the vein open till the injecting fluid comes away pure, then tie the vein and continue the injection till the organ feels hard and the parts are of the color of the injecting mass. Inject before the animal becomes cold, and in cold weather it may be necessary to place the animal or organ in warm water and also keep the fluid warm. Commence with a pressure of 30 m. m. (1 in.) and gradually increase to 100 to 125 m. m. (4 to 5 in.) as it is found necessary. After the injection is completed the parts must be placed in cold water to harden the gelatin before hardening the tissue.

Harden in alcohol, one or two days in 50 per cent., two or three in 80 per cent., then in 95 per cent. It is very necessary to keep this in a cool place. A spool of black linen thread for ligatures, ligating needles and glass canulae are needed. The needles may be made easily from large sewing needles stuck in a handle, the eye end being heated and bent in a curve. It is well to have several of them of various curves. The camulae may be made from glass tubing. They should have a slight shoulder near the point to prevent the thread slipping. See that the complete apparatus is in good working order before commencing, and then insert the canulae, tie and fill it with 1-2 per cent. salt solution. Then fill the rubber tube with the injecting fluid and attach it to the canula.

The following examples will show the method of injecting:

66. Injecting the whole animal.—In the dead animal cut a small opening through the wall of the chest over the heart, avoiding in doing so wounding the internal mammary artery. Pick up the pericardium with forceps, open it and pass a thread through the apex of the heart; pull it forward and cut off the end of the single ventricle of amphibians, or the left in mammals; cleanse out the root of the aorta; pass a ligature around it with a curved needle; pass a canula into the aorta; tie the ligature, then open the right ventricle; clean out the blood from the canula and with a pipette fill it with 1-2 per cent. salt solution; attach now the rubber tube for a small Woulff 's bottle containing the warm fluid, having first filled it with the injection mass; place a pinch cock on the tube and raise the pressure to 30 min. (1 in.); remove pinch cock and increase the pressure till the injecting fluid comes from the right side unmixed with blood, then tie and continue the injection till the capillaries are completely filled; this may be judged by the color of the ears, lips, etc., cool and harden.

67. Injecting Kidney.—Expose the renal vein and artery; make a small slit in artery, pass in canula and tie; pass a ligature loosely around the vein and open it beyond the ligature; fill canula with salt solution; inject as above, and when fluid comes out pure from the vein tighten the ligature and continue the pressure.

68. Small Intestine.—Tie a large string around the large intestine, another around the duodenum and pancreas; tie a canula in the superior mesenteric artery, and loosely tie the superior mesenteric vein; inject as above; tie vein and continue pressure until the vessels are fully distended.

69. Double Injections.—The air chamber of the pressure apparatus should connect with two Woulff's bottles, each containing a different colored mass; (when using for single injection slip pinch cock on the tube of the other). From the pressure being the same in each bottle the capillaries are equally filled with the two colons. In these injections we tie both canulas in firmly and have no escape of the fluid.

Example—Liver.—Tie canulae in portal and hepatic veins, and continue the pressure till organ is quite hard. A triple injection may be made by first injecting the bile ducts with another color.

70. Injection of Lymphatics.—The nozzle of a syringe is thurst into the foot-pad of a cat and a cold solution is forced in and the limb is stroked upward. This is repeated and finaly you get the lymphatics well filled.

A good example is in the leg of an injected frog; force the fluid down toward the web, and you will get a bit of web which shows capillary blood vessels and lymphatics

A method to inject the diaphragm: A rabbit is kept without food twenty-four hours; then 10 c. c. of a warm solution of Prussian blue is gently forced into the abdominal cavity; after four hours kill the animal by bleeding; remove the diaphragm; silver it and mount in glycerine. The lymphatic vessels will be found to contain blue pigment.

71. Imbedding and Sectioning.—The majority of specimens of tissues for examination and permanent preservation are in the form of sections which are stained in such a manner as to assist in explaining their structural details. And while to obtain the best results in cutting these sections some form of microtome is required, other means may be adopted which with practice will give fair results.

The objects are as a rule imbedded in some material or supported in some way. The substance used for these purposes vary and will be described as we proceed.

72.—The knife must be very sharp and ground for this purpose, having one side (that which comes next to the object) ground flat, the other side being concave. The cutting edge must be perfectly true and without bend or flaws, and any tendency to a wire-edge must be removed before attempting to use it. In sharpening use a fine grained stone, moistened with water, or water and glycerine; draw the knife from heel to point without pressure, the weight of the knife being sufficient; turn and push it edge forward so that the point firmly rests on the end of the hone, and repeat, taking care never to allow the knife to be raised from the surface of the stone while drawing.

73.—Sections may be made from fresh tissue with a Valintine's knife, which consists of two thin knife-blades, fixed parallel to each other and the thickness of the section regulated by means of screws, or the fresh tissue if of sufficient consistency as cartilage, etc., or a bit of hardened tissue may be held between two pieces of pith, liver, carrot, or potato, and sections made free hand, or these may be put in a microtome; but for free hand cutting, and in a well microtome other than a freezing one, some of the following methods of simple imbedding are to be preferred.

74. **Simple Imbedding.**—In this form of imbedding the object is merely supported by the imbedding mass, and the tissue is not permeated with it as in the interstitial imbedding methods. The object is taken from the alcohol and the excess of it removed by blotting paper; a small paper tray is made by folding a piece of paper around the end of a square block of wood, a pin or needle is passed through the object and it is arranged as desired in the paper tray, taking care it does not touch sides or bottom; the melted mass is then poured in and cooled; the pin removed; the excess of the mass removed from the surface that is to be cut; the block now is held in the hand, or fastened in the well of the microtome, or this process may be carried out in the well itself.

To aid in the removal of the imbedding mass, the object may first be coated with a thin solution of gum arabic and dried; this dissolves in the water in which the sections are placed, or a thin solution of celloidin may be used; this is dissolved or rendered transparent by the oil of cloves. The knife, while cutting, is wet with weak alcohol.

75. **Wax and Oil Mass.**—Oil and white wax equal parts, and increase the amount of wax or oil as required by the temperature.

76. Paraffine and Tallow.

Pure paraffine	2 parts.
Mutton tallow	1 part.

This has the advantage of not shrinking from the well of microtome.

Paraffine and *vaseline* may be used.

77. Cutting with Freezing Microtome.—A well microtome, with freezing attachment, or the freezing apparatus used on a sliding microtome, is required. Fresh or hardened tissues may be used. If they are taken from alcohol it must all be removed by immersion in running water; they are then placed in a solution of gum arabic in water, from twelve to twenty-four hours; then removed and placed in some more of the gum solution in the well; they are frozen by means of salt and ice, or by vapor of ether, rigolene, etc., or both combined.

The knife must be very sharp, and should be thicker than that used for cuttting with paraffine. The back of the knife is toward the operator and pushed in an oblique manner across the well of the microtome; sections are removed from knife, with a brush, into water.

78. Variations of the above.—Glycerine jelly may be used instead of the gum; the tissue is transferred to the melted jelly and left till infiltrated; place in the well; cover with as little jelly as possible and hold it firmly; the frozen sections are removed and rapidly transferred to a slide; the jelly quickly thaws and causes the section to adhere; place on the section a drop of glycerine; cover and cement; the slide may be gently heated to cause the glycerine to permeate the gelatine.—(Sollas.)

The same method is used as above, by Professor Gage, but using a thick solution of gum instead of the gelatine. In both of them the objects should be stained in mass previous to cutting.

For freezing, ice or snow and 95 per cent. alcohol, (Gage), is more cleanly than using salt.

Snow or pounded ice	2 parts.	gives temp. 5° F.
Sodium chloride	1 part.	

Snow or ice	12 parts.	gives temp. 25° F.
Salt	5 parts.	
Ammonium nitrate	5 parts.	

Freezing is especially good in the study of fat, and in preparing fresh tissue with silver or gold, and when you wish to examine a tissue with the least loss of time.

79. Celloidin Methods.—Celloidin is a preparation of pure pyroxylin, comes in the form of plates or in scrap, and is soluble in absolute alcohol and ether, forming a translucent fluid. It can be obtained from the Educational Supply Co., Boston, Mass.

To prepare, take of absolute alcohol and pure ether equal parts, add pieces of celloidin till when dissolved you have a syrupy solution; dilute a portion of this thick solution with alcohol and ether, thus having two solutions, one quite thin, the other thicker; take the object from absolute alcohol and place in the thin solution for from a few hours to a day, then into the thick solution for from one to three days; from this imbed in celloidin in paper trays, which, when the outside of the mass forms a film, are placed in 80 per cent. alcohol for from one to two days.

It is often better to coat the top of a cork with celloidin; allow to dry; on this surface place the object, cover with celloidin and place in alcohol; the bottom of the cork may be weighted to sink it.

By many chloroform is preferred to alcohol for hardening. The following is the method used by Professor Gage:

A short test tube has a small amount of celloidin placed in it, on this a cork smaller than the tube is placed; the upper surface of cork is also covered with celloidin; allow to thicken, and on it arrange the object; cover with celloidin; expose to air till film forms; then fill tube with pure chloroform; cork, in four to six days the celloidin is hard and transparent—comes out of the tube readily, and is in condition to cut.

If desired a paper tube, with a cork bottom, may be used, instead of the test tube, and place it in a bottle of chloroform.

The knife is kept wet with alcohol, and is fixed in the microtome in a very oblique manner, so as to give a drawing cut. The object if not all cut at once, can be preserved for a considerable time, in 70 per cent. alcohol. In staining, the aniline colors stain the collodion as well, and so can not be well used, but carmine and hæmatoxylon act well; dehydrate with 95 per cent. alcohol; clear with glycerine and mount in same; or if for balsam mounting clear with oil of burgamont, sandalwood, or origanum—clove oil being apt to dissolve the celloidin.

Dr. Minot effects clearing as follows: Place the section in *fresh* 95 to 96 per cent. alcohol; transfer to slide; drain off the alcohol; pour on a few drops of chloroform; add more fresh till it is cleared; add balsam and cover.

(*To be Continued.*)

THE RELATION OF DENTISTRY TO MEDICINE.

BY CHAS. T. HOWARD, D. D. S.

Read before the Joint Convention of the Fifth, Sixth, Seventh and Eighth District Dental Societies of the State of New York, at Rochester, N. Y., October 26, 1886.

This subject has received considerable attention of a wrangling character. The discussions have shown too much pride and arrogance on the part of dentists, and words of contempt, or airs of superiority, on the part of physicians. I want to present it from a scientific standpoint, throwing pride and arrogance to the wind. It is generally classed as an impractical thing, but it is by the study of just such subjects that we can know ourselves, discover our sphere and learn how best to fill it.

Dr. Bonwill says "that of all that constitutes dentistry proper, the mechanical forms the basis, and yet, to make anything that is beautiful in our art, especially in vieing with nature, in matching the teeth, we must be more than mere mechanics, more than capable of filling a tooth or treating an abscess; we must be dental artists." Dr. Bonwill, being a fine mechanic, is, perhaps, a trifle zealous for that branch, but the opinion he gives is candid, far-reaching, and of great weight.

If the workers in porcelain, the decorators of china, together with those who burn into permanency the beautiful figures traced on the surface by the women in our homes, were to-day swept from earth, the dental profession could to-morrow fill their places and furnish the world with its accustomed table sets. Those who can do that are certainly artisans. If the jewelers, because of their riches, should cease to work, the dental profession could to-morrow, in no mean way, fill their places. Those who can do that are certainly artisans. If the surgical instrument makers of our land should go on a strike, the medical practitioner need not worry, for he will find somewhere in his neighborhood an intelligent dentist, who can make for him the necessary articles. Those who can do that are certainly artisans. And so this line of thought and argument could be followed till we came to where the people of the world should lose their teeth. What then? Why, the dental profession could supply them with new ones. Those who can do that are surely artisans. Not only that, but it could tell why they were needed, how they came to be needed, and why they cost so much. Those who can do that must have reached a professional standing in their occupation.

Thus we have established dentists as professional artisans, and as a class would be called a profession. Some would say it is begging the question to stop here, so to meet them we must plod our way through a multitude of words to satisfy the credulous on what we already see to be self-evident.

I have said that dentistry is a profession, for the reason that it is practiced by professional artisans. This is new ground, one that I have never seen in print, or heard mentioned, so it may be shaky—a sort of floating island—a good place for cranberries to grow, but a poor place for walking. I will promise to cross before others are asked to venture.

Profession, when applied to an occupation, includes those that are more dependent on knowledge than on manipulative skill, excluding agriculture, mechanics, and the like. Under this dentistry is not a profession, while theology, medicine, law, letters, etc., are professions. But there is another application of the term, and that makes an opening, where dentistry slips in, and where other occupations can do the same, under like conditions. When a man possesses a thorough knowledge of his occupation, and employs daily, with intelligence, the arts and sciences bearing upon it, he is called expert, scientific or professional. This is an honorary distinction, a reward for merit, and declares on its face what the man has done, and what he is capable of doing in his department. When a large number of such men are engaged in a special occupation, that occupation is rightly and properly called a profession. If the same men were engaged in the same work, but did not possess and intelligently apply a knowledge of the arts and sciences bearing upon it, the occupation would not be called a profession.

Thus there are natural professions, the number of which is limited, and manufactured professions, the possible number of which is indefinite. In the former, a man becomes a professional man as soon as he enters them. In the latter, he is not a professional man till proven worthy. In the former, it is the name of a class. In the latter, it is an honorable personal distinction.

Dentistry is a manufactured profession. It has become a profession by the admirable qualification of its members, and it can remain one only so long as this high standard of qualification is maintained. We can fill teeth, treat abscesses, treat diseases of the gums, make plates, insert metallic and porcelain crowns, and do most of what is called for, while our occupation would be called only a trade.

We can do the same work, combining it in such a way that every step is guided and controlled by our knowledge and application of philosophy, chemistry, metallurgy, physiology, pathology, biology, anatomy, surgery, materia medica, hygiene, mathematics, and their subdivisions, and be experts, professional artisans, making our occupation a distinct profession.

Since a knowledge and intelligent application of the above named sciences has made dentistry a profession, there is no reason why a knowledge and application of botany, geology, zoology, entomology, ornithology, biology, astronomy, philosophy, chemistry, metallurgy, comparative anatomy, comparative physiology, surgery, materia medica, therapeutics, hygiene, etc., with their subdivisions should not make agriculture a profession.

This is used to show that dentistry is a profession, as other arts and industries would be professions if they were followed in the same scientific manner and entered with the same foregone conclusions as commonly prevail with us, that the highest success in them includes a thorough course in an educational institution for theoretical and practical training.

Dentistry is not a profession because its members work on certain organs of the human body, as many suppose; it is not a profession because medicine seems its near neighbor; it is not a profession because of the arrangement of the offices in which it is practiced; nor is it a profession because it is practiced in offices, instead of being wrought in shops; but dentistry is a profession because of the scientific attainment of a large number of the individuals who practice it as an occupation.

There are professional dentists and there are workmen dentists, or those who follow it as a trade. Those who follow dentistry as a trade, or without scientific attainments, have no more right to be called professional men than the ward-school boys have to be called professional baseball players, and yet we cannot help the great pretentions they put forth in the daily papers.

There is one man to whom we owe a debt of gratitude, Doctor Chapin A. Harris, who, in establishing the dental college, did more to make dentistry a profession than any other man who can be named. It is the dental college that has made dentistry a profession, by the learning it has pounded into the heads of the individual, though much of the pounding has been in vain.

The standing of dentistry to-day is the strongest argument for schools of technology that exists, and stands before the world as a grand example to encourage educators in establishing them, and places the great utility of institutions for practical training in the various arts and industries beyond the question of doubt. But everything about dentistry hurts so that educators seldom mention its system of training. Perhaps they fear it would give them the toothache. This standing as a profession, won by its own labors, is an honor we should be proud of, and one we should seek to increase by broadening and deepening our knowledge of the arts and sciences bearing on our occupation.

In the sense of profession, medicine and dentistry are birds of different feathers, and since the late Sothern had such difficulty in getting birds of a feather to flock together, what hope have we when their feathers are not alike. Medicine is one kind of profession, dentistry is another. That makes it impossible for either to be specialties.

Dentistry is so large as to even have its own specialties. And for a specialty to have its specialties, would be getting things down too fine. If dentistry was a specialty of medicine, then the making of artificial teeth would have the same relation to medicine as the making of artificial limbs, it could not be otherwise, and so with the insertion of metallic and porcelain crowns, etc. What is known as dentistry could exist no longer, but would be cut to pieces and scattered to the four winds. After the whole was cut up, one or two of the parts might be considered specialties of medicine, the others would have to shift for themselves—go into shops on Water street, or be worked by horse power—they might finally get to taking orders by mail or by telegraphic photography.

Then again medicine has several schools. Of which one would dentistry be a specialty, regular Aleopathic, Homeopathic, or Eclectic? Triturating gold foil would be of doubtful expediency, and the thirtieth hypotancy of a drop of solution of chloride of zinc would let our patients carry their alveolar abscesses to the grave. If the different schools are any good in general practice, they ought to be of use in the specialties. This might also divide dentistry, or what little there would of it, as a specialty of medicine.

Such an occurrence is by no means wanted, so we had better not join that profession till it proves itself to possess a level head and a spirit of union.

Even the possession of M. D. cannot make dentistry a specialty of medicine. It gives the dentist a larger field by his increased knowledge in certain sciences, and this makes him more proficient in certain directions, but it has no more effect on the relation of his occupation, than it would if an M. D. should enter the bar.

Perhaps too much of this paper has been on the subject "Why dentistry is a profession," but as it is the key to the position taken, on "dentistry's relation to medicine," it needed careful attention. Before it is denounced or destroyed, I trust a better argument will be furnished for its place.

It would give delight to hear one different in tone from those on record; one of which we need not feel ashamed; one we can use with confidence; one that will bear the noon-day sun; one that will be received outside our ranks; one that does not assert we should be a profession, therefore we are a profession; or that we are a profession, because we want to be one; or that we are a specialty of medicine, therefore we are not a profession, or vice versa; or that we are a profession, because we are a profession.

LABORATORY HINTS.

BY J. H. BEEBEE, D. D. S., ROCHESTER, N. Y.

Read before the Fifth, Sixth, Seventh, and Eighth District Dental Societies, at Rochester, N. Y., October, 1886.

I feel a little diffidence in presenting this hastily prepared paper, following as I do, the larger guns which have so ably given evidence of their strength. Still we read that one of the great generals of antiquity was killed by a common soldier, who drew a bow at a venture and smote his victim in the eye. I hope, therefore, that my popgun may not be without its effect, though it may not be as far-reaching in its result as the arrow of the soldier.

I do not wish to convey the idea that I am going to give you something entirely new, but hope that what I may say will be of aid to those who must find difficulties, as I found them. Nor do I wish it understood that the remedies I shall suggest for such difficulties are infallable. We all have failures, and often when we seemingly take the utmost precaution we are greeted with an unsightly blemish or fatal defect in our work.

I will first mention "cracked gums."

When a student I was continually troubling my preceptor by producing cracked and splintered gums and broken sections, and for a long time after I had entered practice I strove to find the cause. I labored carefully to make fine joints, and alas! often when I had bestowed the utmost care my cases would come out with a nicely defined diagonal fracture, beginning at a point about the middle of one of the front sections and running to a point over the lateral incisor. I studied journals and asked questions and received various answers, such as "contraction of the rubber," "the fracture is made in removal of case from plaster," "too much pressure in closing flask," "improper or insufficient gateage for overflow."

I tried a remedy for every one of these, but with very little success. It is true that the contraction of the rubber is the active cause, and generally produces it, but as a usual thing this cause is easily obviated by a very simple rule of seven words:—"Make a perfect joint in front and rear." Do not allow the sections to meet only at the surface of their respective gums. The surface of the gums are almost always convex, and if the joint is open on the lingual side of the section, the two sections only touch at one point, and do not support each other; while if the joint is properly made they will be in contact from the top to the bottom, and will mutually support each other like the stones of an arch.

Another cause is *improper waxing.* Many persons allow too much wax to overlap the gum, giving place for a large and strong mass of the rubber to flow over and contract upon the porcelain. This being objectionable, it is best to grind off the little tongue that runs along the upper edge of some of the older patterns of teeth.

Many sections are cracked also by setting the case improperly in the plaster. The wax around the gums should always stand above the surface of the plaster in the drag or lower part of the flask. If not, when the case is parted for packing the edges of the gums will stand above the surface of the plaster in the cope or top of the flask and be unsupported; and when the flask is brought together, the plaster in the lower part is apt to press against the gum. Especially is this the case should a little rubber get in, or should there be imperfectly fitting guide-pins on the flask. If the above is followed it is quite safe to pack a case perfectly cold, so far as danger of fracture is concerned.

One other pest of the laboratory is dark joints, and there are various causes that creep in to render the cases we often wish to be our best, anything but what we could desire. First of all, the great cause is not rubber, but *wax*. You may grind your joints ever so carefully, and boil them or rinse them out with hot water ever so thoroughly, but if there is a particle of wax in them, or if a particle has been in, you may look for discoloration. Take a piece of glass or porcelain, and melt some wax on its polished surface, and boil it in water ever so long, and as long as it is not rubbed it will remain greasy, and the heat of vulcanizing is sufficient to discolor it. Now a ground surface, like that of a fitted section, is far more difficult to clean than a polished surface; then too, hot wax is a solvent of rubber, and will lead the vulcanite into the joint. How can this be avoided? By simply keeping the wax out by keeping the ends of the sections wet. If wax gets on them grind it off, for you cannot clean it.

One other cause. I noticed a brother in the profession, the other day, grinding up a case, and in order to see what kind of a joint he was making, he touched the sections with the tip of his tongue, thus wetting the joints. If any saliva gets into a joint before vulcanizing, there will be discoloration, as the organic matter contained in it will char and blacken under heat.

Every joint should be thoroughly protected, and the best article for this purpose is undoubtedly oxyphosphate. I usually, when the case is waxed, cover the joint externally with it, allowing it to flow somewhat over the wax, and when the case is parted in the flask, cover the anterior portion of the joint, also allowing the cement to meet that which I first applied, thus surrounding the joint with a solid wall.

Dark joints are also due to great pressure in closing the flask. This is very easily obviated by being careful of the amount of rubber put into the mould. One of the simplest, and I think the best way to avoid this, is a process taught, I think, in the Philadelphia Dental College. It is to heat the top of the flask (the part containing the teeth), having previously placed an amount of rubber that would be a little less than enough for the case. Now put over the cast a piece of the cloth, wet, such as is found between the sheets of rubber, and from which *nearly* all, not *all*, of the starch has been washed; bring the flask together under the press, and force it home; open it; remove the cloth, and it is easy to see where material is needed or to be removed; gate the case well and screw up and vulcanize.

When at Buffalo last fall, we were favored with some very instructive remarks on vulcanite work, by Dr. A. P. Soutwick. He advocated the use of silex as a preparation for the cast, in order to produce a good finish on the palatine portion of the plate. I have tried his method, but I find I prefer tin foil to it, for though this process gives a very good surface, the tin gives a better. My mode of operation has its peculiarities, and insures the easy separating of the tin from the plate.

After having determined, as above mentioned, the amount of rubber needed, varnish the cast thoroughly with silex, and lay on a piece of No. 3 tin foil; press and smooth it thoroughly on the cast, using a pledget of cotton, or, better still, a rabbit's foot; do not use your fingers, as you are apt to grease the surface, and if that is done, ever so slightly, you may look for the tin to stick. Now soak a piece of the cloth used between the sheets of rubber, until its starch is softened, and with a soft hair pencil apply this starch to every part of the exposed surface of the foil that is on the cast, and before it has time to dry, bring the flask together and bolt it. If you desire to boil it, before bringing it fully down, press it together fairly well so that no water can get in and wash out the starch.

By following these directions the tin will very often come off upon the cast, leaving an almost polished surface—so good, in fact, that in making regulating plates, it is not necessary to finish to a greater degree than this gives, if placed beneath the springs. Should, by chance, any of the tin become fastened upon the surface of the rubber, it is very easily removed by wetting a piece of cotton with dilute muriatic acid, and having sprinkled the offending surface with a few drops of mercury, rubbing with the cotton. The acid cleans the tin and allows the mercury to amalgamate, and in this state the tin is easily washed away.

Another simple little process was told me, a while ago, by a friend in the profession, and which I find is quite a valuable hint. It is in regard to the process of burying the teeth in the plaster, in cases where it is deemed best not to pull them from the wax. It is to set the case in the top or cope of the flask, just as though it were the ordinary bottom or drag. The cope, usually being deeper than the drag, it enables one to bring the cutting edge of the teeth level with the top of the inverted metal rim, thereby gaining more strength than is obtained with an unsupported raised rim of plaster. After the plaster becomes hard, and has been varnished, cover its surface with soft plaster, and also fill the drag with the same, and bring them together, and when hardened proceed as in the ordinary work.

I wish to speak in favor of Gilbert's varnish that has lately been placed upon the market. It is intended for use in the laboratory. With it no oil is needed, and it gives to the surface of a cast an almost polished smoothness, and the softness often seen on plaster surfaces, where oil is used, is entirely absent, and consequently a more accurate cast is produced and more perfect surface on the plate.

One thing I must warn you of in using dry heat in packing: You must be careful not to heat your case too hot, for the penalty will be porous rubber. If the rubber is once heated, so that it is porous, it will always remain so.

CONVENTION OF THE FIFTH, SIXTH, SEVENTH AND EIGHTH DISTRICT DENTAL SOCIETIES OF THE STATE OF NEW YORK.

REPORTED BY DR. CHAS. T. HOWARD, RECORDING SECRETARY.

The Seventh and Eighth District Dental Societies of the State of New York have for eighteen years held a joint convention in the fall of each year. These conventions are held alternately in Buffalo and Rochester. Aside from a joint business committee, these annual reunions are in charge of the society of the district in which they are held. They always prove interesting and profitable to those who attend.

Each district is the home of a dental journal, and the papers and ideas presented at these conventions, as well as at the regular annual meetings of the respective societies every spring, form no small source of the periodical literature of our profession.

This year it was Rochester's turn to hold the meeting, (the bar of Rochester is generally satisfied when such is the case). So the Seventh district society, finding through its treasurer (for he is an honest man, and such do not flee to Canada) that it was rich, and knowing not what to do with the possessions that burned its banker's pocket, sought a new vent for this accumulated energy. Thus the Fifth and Sixth district dental societies which live in the east, though this side of where missionaries are sent, were invited to take part in the eighteenth annual convention of the Seventh and Eighth district societies. They thought awhile before going west, but finally, from what motive, Indian hunting or prospecting, I dare not say, they accepted the invitation and promised a few paper wads for the occasion.

In the course of time it leaked out that something concerning teeth, the stomach, and the mind, was about to occur in Rochester on the Genesee. Dentists are always attracted by such things, especially those in the west. Who has ever traced the ramifications of dental " nerve" as it winds here and there through different communities, coming to light in trim offices pointed out by little signs, and taking to the railroad on occasions like that about to be narrated?

Thus it was that on October 26th, 1886, there assembled in Rochester a crowd of what some would call hungry revolutionists by their doing, but which was in fact a goodly number of earnest, thinking dentists. They were, with some difficulty, called together in the New Osburn House (at 11 A. M.) by Dr. B. G. Saunders, of Rochester, President of the Seventh district society, and who presided during the session. There were ninty-four present, eighty members and fourteen visitors.

The forenoon was consumed with such business matters as pertained to the joint convention, and separate meetings of the several district societies for such purposes as related to their individual affairs. One thing done in the joint morning session, perhaps worthy of note as being a change of common practice, was the adoption of the following resolution introduced by Dr. H. S. Miller, of Rochester :

Resolved, That all dentists and physicians, present at this convention, of good standing in societies, be given the privileges of the floor.

An attempt was made to so amend the above as to include all present, but it was defeated.

The convention was called to order at 2:15 P. M. by Dr. Saunders, who delivered a short address of welcome to the Fifth, Sixth and Eighth district societies.

Dr. Geo. L. Curtis, of Syracuse, then read a paper on "Implanting Natural Teeth in Artificial Sockets." (See *Independent Practitioner* for January, 1887).

The paper was discussed at considerable length. In response to questions, Dr. Curtis said he had set a tooth where one had been extracted six years before. He had set a tooth that had been out of the mouth eighteen months, but considered two weeks the advisable limit. The process, about the teeth implanted, filled out to quite an extent. He would not advise it after senile degeneration had commenced.

Dr. Norman W. Kingsley called the operation empiricism of the rashest kind, but so near science that no one should say it was not scientific.

Dr. A. P. Southwick doubted the character of the union being good.

Dr. W. J. Younger, of San Francisco, who was present announced that he was ready to proceed with the operation of implanting a natural tooth in an artificial socket.

The convention repared to the room and the operation was performed. The patient was a man about thirty years of age. The operation consisted of setting a tooth, where or how long extracted was not known, in the place of the superior right first-bicuspid which had been extracted about six months before. It required about three-quarters of an hour. When finished the tooth was held in place by good adaptation to the socket and the articulation of the lower teeth, no ligatures or other appliances being required. The patient said the pain was not great; but felt as though there was something expanding inside the bone, causing a numbness or heavy feeling.

After the operation, which was pronounced by all to be wonderful if successful, the convention was again called to order.

A paper was then read by Dr. Chas. T. Howard, of Rochester, on the "Relation of Dentistry to Medicine." (See ODONTOGRAPHIC JOURNAL, January, 1887.) The paper maintained the independence of dentistry as a distinct profession on the ground that it is a profession for other reasons than those for theology, medicine and law.

Dr. Norman W. Kingsley, of New York, wished to publicly thank the essayist for the views expressed. He made a few remarks and then read a paper, entitled "Dentistry Not a Specialty of Medicine." (See *Independent Practioner* for January, 1887.)

This paper was the same as read before the New England Society early in the month, and later before the First district dental society of the State of New York. After the reading of this paper, Dr. F. French, of Rochester, introduced the following resolutions:

WHEREAS, Dentistry in America is practically an independent profession and not subordinate to any other, and

WHEREAS, All of the great attainments in dental science have been reached through separate literary, educational and scientificate organizations, and

WHEREAS, Dentists throughout the world look to their professional confreres in America, for the further advanvement of dental science; therefore,

Resolved, That in the interest of dentistry as an independent profession, immediate steps be taken looking to the formation of an International Dental Congress, to be held in this ceuntry, and to which every reputable dentist in the world shall be entitled to admission and all its privileges.

Resolxed, That a committee of one be appointed from each society represented in this convention, who shall form a joint committee whose duty shall be to coöperate with similar committees from other societies, for the purpose of establishing such a congress, at as early a date as arrangements can be made, which will make such a congress a credit to the dental profession in America.

Resolved, That we recommend the city of New York as the most suitable place in which to hold such a congress.

Dr. Chas. T. Howard seconded the resolutions.

Dr. W. C. Barrett, just entering the room, caught the subject before the convention and made some earnest remarks in favor of the resolution, and pledged his hearty support of an International Dental Congress.

On a vote of the convention the resolution was unanimously adopted.

The following named gentlemen were appointed to form the joint committee:

5th	District—	Dr. S. B. Palmer, Syracuse.
6th	"	Dr. A. M. Holmes, Morrisvilie.
7th	"	Dr. F. French, Rochester.
8th	"	Dr. A. P. Southwick, Buffalo.

The convention adjourned to meet at 8 P. M.

Dr. N. W. Kingsley delivered a lecture on "Cleft Plate." To this lecture the members of the medical profession of Rochester and vicinity had been invited.

A large part of the lecture was given to the mechanism and production of articulate speech. He said that an artificial apparatus was of little value without subsequent special training. That the child with a slight congenital cleft-plate could by a system of training be made to speak well without the fissure being closed by surgery or artificial appliances. That he had perfected such a system and tried it with success. He greatly preferred a mechanical closure of the fisure to a surgical one.

Dr. E. M. Moore, Sr., of Rochester, being called for gave his experience and conclusions from a surgical point of view. He agreed with Dr. Kingsley as to the necessity of training, but differed with him in regard to the relative value of mechanical appliances and the surgical operation. He, however, admitted his experience had not been as extensive and his studies of the subject as thorough as Dr. Kingsley's.

After the convention adjourned to meet at 9 A. M., the members and a few invited guests partook of a supper furnished by the Seventh district society.

Dr. F. French acted as toast-master and enlivened the small hours of the night by the manner in which he proposed the various toasts, and his introduction of those who responded. The responses were laden with jokes on the dentist, but the way they were received is good reason for saying none were taken to heart.

SECOND DAY, OCT. 27TH—MORNING SESSION.

The convention was called to order at 9:45.

Dr. F. E. Howard, of Buffalo read a paper entitled "A Case in Practice." It related a very aggravated trouble of twelve or thirteen years standing in an apparently healthy upper molar. When extracted as became absolutely necessary, an abcess was found located in the bifercations of the roots. The final trouble that compelled extraction was subsequent to a hypodermic injection of the oleate of cocaine.

Dr. H. S. Miller thought it might have been due to a blow directly on the masticating surface, or to overwork from defective articulation.

Dr. W. C. Barrett. Thrombosis could and does cause abcesses and why should it not lead to an abcess located as the one mentioned as well as in other parts of the body? The case is one of extreme interest.

Dr. G. W. Mellott, of Ithaca, read a short paper on "Crown and Bridge Work." After reading the paper he gave a talk on the requirements for successful work, and demonstrated the use of his many appliances. The subject was made very interesting. Owing to want of time and much to be done, a majority of the convention voted to pass it without discussion.

Dr. F. Darby, of Elmira, followed with a paper on "A Suggestion." The paper was founded on the responses to an advertisement for an assistant. It portrayed a gloomy out-look for those in need of good assistants. From lack of time a majority voted to pass the subject without discussion.

Dr. L. W. Bristol, of Lockport, then read a paper on "Reminiscences and Incidents of Dental Practice."

Dr. Bristol is the recipient of a standing invitation from the Seventh and Eighth district societies to present at each of their annual joint conventions, a paper bearing on the early history of dentistry in Western New York, the papers so presented to be published in the *Independent Practitioner*. See *Independent Practitioner* for Dec., 1886. This series of papers has been of great interest and very enjoyable.

The convention adjourned to meet at 2 P. M.

AFTERNOON SESSION—SECOND DAY.

The convention was called to order at 2:15.

Dr. G. B. Snow, of Buffalo, read a short paper on "Experiments in Vulcanizing." After the paper he explained his various experiments, about fifty in number, and exhibited pieces of rubber vulcanized under different conditions, showing the results attained. He considered rapid heating and cooling to be harmless. The fracturing of blocks and rubber going through the joints to be due to the great expansive force of the rubber The temperture should not go above 300 F.

As far as density and toughness is concerned there is no difference from dry or moist heat. He found it best to expel the air from the vulcanizer either by opening a valve or boiling for a few minutes before closing the top.

Dr. A. P. Southwick agreed with Dr. Snow in regard to temperture, heating up and cooling. After mending a plate he found the shape was different, the center was higher, and the plate narrower across the heel. This he corrected by placing the plate on a cast, previously made, heating it over a flame and holding the plate at the position of the molars on each side tightly to the cast till cool. This would draw the center down so the plate would press more on the alveolar ridge.

Though the subject was of great interest and its presentation contained much that was new, a majority voted to pass it without further discusion.

Dr. W C. Barrett moved that a committee be appointed, composed of the chairman of the Board of Censors of each district represented at the convention, to consider the subject of holding the semi-annual meetings of the Fifth, Sixth, Seventh and Eighth district societies together, such committee to report to their respective districts at their next annual meeting.

The motion was unanimously carried.

The cammittee is composed of the following named gentlemen :

5th District—Dr. S. B. Palmer, Syracuse.
6th " Dr. A. M. Holmes, Morrisville.
7th " Dr. H. G. Knickerbocher. Seneca Falls.
8th " Dr. L. W. Bristol, Lockport.

Dr. S. B. Palmer, of Syracuse, read a paper entitled "Discriminate Use of Gold in Filling Teeth." He gave due credit to all filling materials, and classified in an able manner and on chemical, philosophical, and physological laws, the type of teeth and position in which each could be used with assurance of success.

From lack of time a majority voted to pass the subject without discussion.

Dr. J. H. Beebe, of Rochester, read a paper on "Laboratory Hints."

The paper contained many useful suggestions.

Dr. A. R. Cook, of Syracuse read a paper on "Irregularities of the Teeth."

The subject was, by a vote of the majority, passed without discussion.

Resolutions, thanking Dr. N. W. Kingsley for his time and kindness; Dr. W. J. Younger for the clinic given; Mr. E. Almey, proprietor of the New Osburn House, for the accomodations furnished, and the press of Rochester for the attention shown, were unanimously adopted.

Dr. H. S. Miller, of Rochester, introduced the following resolution:

Whereas, Our different State Dental Societies are governed by a proper and professional code of ethics, to which each member subscribes, and agrees to abide by, a violation of which code subjects the violator to expulsion: and

Whereas, The attendance at our different dental colleges is greatly augmented in consequence of such State laws and codes, and as the object of the dental college is supposed to be for the greatest good of the profession, therefore be it

Resolved, That the different dental colleges be earnestly requested to enact an equivalent code of ethics, to which every graduate shall subscribe; and further more, that any infraction of said code on the part of a graduate, if proven, shall result in a revoking of his diploma and title.

The resolution was seconded by Dr. G. L. Curtis.

Dr. W. C. Barrett said some of the colleges are doing villainous work. The resolution should be adopted; it might lead to something more authoritative.

Dr. S. A. Freeman pointed out that the resolution does not imply that we, as a convention, have any power in this matter, but is simply a request.

Some one said the revoking of a diploma or title by a college was not possible under present laws. It was the general opinion that the resolution ought to be adopted and copies sent to college faculties and various organizations. Compliance with its spirit or the gaining of its object in some way was not an impossibility. A few lectures on professional ethics during each course by members of the faculty or some favorite practitioners would do much to destroy the the evil

The resolution was unanimously adopted.

There being no further business the convention adjourned.

ON THE USE OF CORROSIVE SUBLIMATE IN THE CLEANSING AND DISINFECTION OF PULPLESS TEETH AND ROOTS.

We have used nearly all the antiseptic fluid disinfectants and germicides that have, up to this time, been experimentally known in the treatment of pulpless teeth, and in looking over the list we feel free to mark many of them "good."

Faithful work will bring about good results with many of these articles, whilst bungling or careless manipulations will produce only failure and disappointment with the best. We do not rely solely upon any one of these agents in the treatment of pulpless roots.

We wish to speak of one here, but not to introduce it as one of our hobbies.

For the past twelve months we have been using bichloride of mercury a great deal, and we think the results warrant us in giving it an extra good mark on our list. Our experiments have, so far, been confined to the officinal aqueous solution, which is about one and one quarter grain to one and one-half grain to the ounce. No doubt it might be employed in much greater strength with safety, if care were taken to confine it strictly to the pulp canal. Just here, however, we would speak a word of caution: Do not introduce this medicament in great strength into a foul canal and stop it up there, for it *might* be injected by the gases that could possibly arise into the alveolus, and produce corrosive sublimate poisoning. We think no harm could come of the officinal solution, stopped up however long, in the small quantities a tooth would hold.

"Ah! ha!" you say, "then you don't rely upon it to hold chemical decomposition in abeyance?"

Well, yes, we rely upon it more than any other agent we know for this very thing, but we don't take a loaded gun and snap it at our head because the powder is supposed to be wet. How can you tell that every atom of sulphur and hydrogen in such tooth is separated and fenced about with your bichloride of mercury? They might get together and do no harm; then, on the other hand, the devil might be to play. Take no risks.

We have been proceeding very cautiously, and thus far have not had a single sore tooth after opening. We have relieved many that were very sore before opening. After opening the tooth we wash out freely with tepid water; and, if there has been much previous soreness, we let this suffice for the first sitting, permitting the canal to empty itself by drainage as much as possible. At the next sitting we introduce our solution of bichloride of mercury, on a fine well-tempered broach, wrapped with a little long-fibred cotton, taking care not to force any thing through the foramen. This will sometimes occur in spite of all our caution, and we think it has often happened in our own hands, so far without bad effects. No uneasiness need be felt about mercurial poisoning from the mild officinal solution in the event of this accident, and there will be almost no danger of poisoning the soft parts with septic matter from the tooth, provided the bichloride of mercury goes through with it.

After repeated wipings with this agent, we lay it aside and take up alcohol, cleansing in like manner with this thirsty fluid to extract the foul water from the dentine by capillary attraction. As soon as soreness is all gone, and we are sure the canal is clean, we proceed to fill.—Noel, *Dental Headlight.*

DIETETIC FALLACIES.

1. That there is any nutriment in beef tea made from extracts. There is none whatever.

2. That gelatine is nutritious. It will not keep a cat alive. Beef tea and gelatine, however, possess a certain reparative power, we know not what.

3. That an egg is equal to a pound of meat, and that every sick person can eat them. Many, especially those of nervous or bilious temperament, cannot eat them, and to such eggs are injurious.

4. That because milk is an important article of food, it must be forced upon a patient. Food that a person cannot endure, will not cure.

5. That arrow-root is nutritious. It is simply starch and water, useful as a restorative, quickly prepared.

6. That cheese is injurious in all cases. It is, as a rule, contra-indicated, being usually indigestible; but it is concentrated nutriment and a waste-repairer and often craved.

7. That the cravings of a patient are whims and should be denied. The stomach often needs, craves for, and digests articles not laid down in any dietary. Such are, for example, fruit, pickles, jam, cake, ham, or bacon with fat, cheese, butter and milk.

8. That an inflexible diet may be marked out, which shall apply to every case. Choice of a given list of articles allowable in a given case must be decided by the opinion of the stomach. The stomach is right and theory wrong, and the judgment admits no appeal.

A diet which would keep a healthy man healthy might kill a sick man; and a diet sufficient to sustain a sick man, would not keep a well man alive. Increased quantity of food, especially of liquids, does not mean increased nutriment; rather, decrease, since the digestion is overtaxed and weakened. Strive to give the food in as concentrated a form as possible. Consult the patient's stomach in preference of his cravings; and, if the stomach rejects a certain article, do not force it.—*Technics.*

TREATMENT OF ALVEOLAR ABSCESS AFTER FILLING ROOT CANALS.

Sometimes a pulpless tooth comes to us for treatment, having a blind abscess at the point of one or more roots. This condition is not always recognizable. We cleanse and disinfect the tooth, fill permanently, and expect to hear no more about it. Such is not the case. The patient continues to complain of soreness in the alveolus over the region of the root, (it is a curious fact that there is seldom any inflammation of the pericementum, or soreness upon occlusion in these cases), and after some time, it may be weeks or months, the abscess points externally, and we open it. Does it get well? Not much. Should the dentist indulge in vain regrets about not having kept the thing open longer? No; if the canals were thoroughly clean, what possible good could come of keeping it open! He has done exactly right, and as far as he has gone the work is complete. No thought of removing the filling should be indulged a moment, but after evacuating the pus inject a little Lugol's solution of iodine into the sinus, and it will get well.

The iodine solution may usually be introduced upon a broach, as into a pulp canal; thus, wrap a little absorbent cotton on a broach, dip this into the solution, and pass gently along the track of the sinus. It is best to use for this purpose the broaches made of gold wire, as iodine rapidly corrodes and renders brittle the steel instruments. Occasionally difficulty is encountered in finding access to the cavity of the abscess along the track of the sinus, and here the hypodermic syringe may be brought into requisition.

We have sometimes found it necessary to make a direct opening into the cavity of the abscess with a spear drill in the engine, but when practicable we prefer treating the entire pus track with the iodine solution, it being lined throughout with a pyogenic membrane, which it is our object to break up.—NOEL, *Dental Headlight.*

PHYSIOLOGY OF DIGESTION.

The physiology of digestion has been so thoroughly investigated of late years, that it would seem that there could be very little opportunity for difference of opinion on most of its leading principles, and yet we find that authorities are on some points very much at variance. We are told that nothing can be more prejudicial than the habit of chewing gum, supposed to be so common among school-children. The salivary glands are unnaturally excited, and pour forth so much saliva in the act, that when food is masticated they are not able to respond as fully as is necessary for the proper insalivation of the food.

We are also informed that food should not be eaten just before retiring; that thoroughly refreshing sleep requires perfect repose of all the organs; and that, if we go to sleep with a more or less full stomach, sleep will be disturbed and unsatisfactory.

The authorities of Amherst college evidently do not agree with these views. In the instructions which they give to their students to guide them in their gymnastic exercises, after specifying the kind and amount of physical exercise, they recommend sleeping for half an hour after dinner and supper, if possible, and, if sleepless at night from brain-work, to eat a few graham crackers before retiring, to draw the excess of blood from the brain to the stomach.

In reference to the practice of chewing gum, this statement is made: chewing gum daily before eating and between meals increases the flow of saliva, and so aids the digestion of fat-making foods. It also indirectly stimulates the secretion of the digestive juices of the stomach.

We have no means of knowing, but we presume that Professor Hitchcock of Amherst, who is himself a physician, is largely responsible for this advice, and have no doubt that he has given it after mature consideration. We fully agree with what is said in the instructions about the usefulness of food in cases of sleeplessness, and believe that many a person has been kept awake at night from a mistaken idea of the necessity of abstemiousness before retiring. This, of course does not mean that late suppers are under all circumstances to be recommended; but a few graham crackers can never do harm, and will often do good. In regard to the chewing-gum, we do not feel so sure. Besides being a practice, which is, from an æsthetic point of view, not to be encouraged, it is very doubtful whether, under the most favorable circumstances, it is really a benefit to digestion; and, until there is some guaranty as to the composition of what is called chewing-gum, we should hesitate before recommending it in such unqualified terms.—*Science.*

JOHN M. COOPER, D. D. S., vs. ILLINOIS STATE BOARD OF MEDICAL EXAMINERS.

"In the June term of the circuit court a petition for mandamus was filed by John M. Cooper, against the State board of dental examiners. He related that he had entered the Chicago College of Dental Surgery in November, 1884, and remained throughout the five months' course of instruction. Then he transferred his studies to the Northwestern College of Dental Surgery. Having complied with the State law in completing two five-month terms, he was graduated April 3, 1886. and given a diploma. On May 12, Mr. Cooper presented his diploma to the State board of dental examiners, but they refused to grant a license, and referred the matter to the National Association of Dental Examiners, a voluntary association. The license was refused, on the pretense that the Northwestern college was not reputable. Cooper further alleged that the State board of dental examiners consisted of five members, four of whom—G. V. Black, A. W. Harlan, George H. Cushing, and C. A. Kitchen—are connected with the Chicago college of dental surgery; that the two colleges are rivals, and the State board is determined to cripple and destroy the Northwestern college. A mandamus was asked for to compel the State board to furnish the license to practice.

"A demurrer was filed by the respondent, but was overruled by the court, and judgment in accordance with the prayer of the petition. An appeal was taken for a reversal of the judgment.

"In affirming the judgment, Judge McAllister, in the appellate court to-day, said the allegation by the relator that the board of dental examiners had found that the Northwestern dental college was not a reputable college will not bar relator's right to relief. The statement that this action was taken maliciously to injure the Northwestern college must be taken as true, as admitted by the demurrer, and shows a clear abuse of discretion on the part of the board, which could not admit such allegations and escape the control of the courts on the suggestion that the discretion reposed in it cannot be interferred with. 'The duty to be performed by the board is one in which the relator has a direct interest, and by its non-performance he is injured and agrieved.' Judgment was affirmed."

The above clipping from the Chicago *Mail* of December 22, 1876, will he interesting reading to the profession throughout the South, and particularly so to members of boards of dental examiners.

The necessity of such a suit is to be regretted. The result must serve as a warning. Conservatism, and not arbitrary rulings, should characterize the actions of boards of examiners The Illinois board recently obtained a judgment in a mandamus case against it to the effect that it was the sole judge of the "responsibility" of dental schools whose graduates applied to it for license to practice. This decision, we fear, will cut quite a figure in the courts in similar cases, and tends to weaken the authority of boards. It is clearly demonstrated that college professors, or those interested in dental schools in any manner, should not occupy places as examiners.

The gentlemen whose names are thus paraded before the public are men of prominence, and we feel assured they were honestly striving to discharge their duty, but were unfortunately circumstanced. The language of the article, however strong it may seem, is what has been heard from many sources against this board, and had it listened to kindly words of warning might have been saved the chagrin of this defeat and publicity of these charges.—*Dental Headlight.*

STERILITY, RELATIVE AND ABSOLUTE.

The interval between marriage and the birth of the first child, is given in over 6,000 cases in a table prepared by Ansell. This gives a mean interval of nearly sixteen months. The majority are born before the close of the first year, nearly seven-eighths before the close of the second year. In 421 cases the first child was born after three years of married life, and before the fourth year was completed; while in the years after the fourth there were only 222 taken altogether. From these data and similar results in other tables, Dr. J. Mathews Duncan concludes that married women delaying the commencement of fertility beyond six months, are already exhibiting a degree of relative sterility, and that when a married woman remains until the end of the fourth year without conceiving, the probabilities are strong that she will prove absolutely sterile.—*British Medical Journal.*

DEMONSTRATION OF THE FIBRILLÆ OF UNSTRIATED MUSCULAR FIBRES.

For demonstrating the logitudinal fibrillation of unstriated muscular fibres the following method has proved very satisfactory: Ten to fifteen cm. of perfectly fresh small intestine from a cat or other animal is tied to one end and into the other is injected the following mixture: ninety-five per cent. alcohol, twenty-five cc., water seventy-five cc., picric acid crystals three-fourths of a gram. When the intestine is moderately distended the end in which the injection is made is tied and the piece of intestine placed in a glass dish and covered with the mixture. After one or two days the muscular coats may be torn off in shreds. If one of the shreds is teased well with needles, unstriated muscular fibres may be partly or wholly isolated. They may be mounted in seventy-five per cent. glycerine. The picric acid stains the fibers yellow and with a homogeneous immersion (1-12th or 1-18th) the longitudinal fibrillation shows with the greatest clearness. In some cases the ends of the fibres will be frayed and show the fibrillæ something like a brush.—GAGE, *The Microscope.*

OPEN MOUTHS.

"I am going to write a book on unnoticed peculiarities," says a Pittsburgh man, "and am going to devote an entire chapter to the fact that ninety per cent. of all the women one sees passing on the street will have their mouths open. I have made a number of observations, and figure it up this way: Out of 100, 1 will have the toothache; 5 will be chewing gum; 29 will be talking; 34 will imagine they have pretty teeth, and will be trying to show them; 6 will be asthmatic, and have their mouths open to breathe, and 15 will be staring straight ahead—looking at nothing in particular, but just keeping their mouths open. Of the 10 who are not included in the list at least 8 will be old ladies without teeth. Out of 100 men, 10 will be noticed with their traps unclosed."—*Daily Paper.*

FIXATION OF REIMPLANTED TEETH.

1. By simple encapsulation of the root. This mode of attachment is, I believe, frequently referred to in dental literature.

2. By the bundles of connective tissue which fill up the irregular absorption spaces, just as a very porous body might become attached to soft tissue by the latter glowing into and through the interspaces. I have a number of specimens showing this mode of union, which I have called a pseudo-attachment.

3. By a direct union of the surrounding tissue with the *living* pericementum. This I am inclined to look upon as the only permanent attachment.—MILLER, *Independent Practitioner.*

A CHEMICAL-PHYSIOLOGICAL INQUIRY.

Two correspondents from Aurora, Neb., write: "Can we have a physiological action of any drug without a chemical action?" Certainly not. All vital phenomena are the expressions of molecular changes in the cells, and such molecular change is "chemical action."—*Medical Record.*

DRINK WATER!

A healthy adult excretes about ninety ounces of water per day, as follows: Lungs, 14 ounces; skin, 26 ounces; urine, 50 ounces.

That means that these proportions must be supplied in order that the vital processes may operate effectively and normally.

How is it done? Fifteen or twenty ounces are combined with the solid food, and therefore we must take as beverage each day seventy or seventy-five ounces.

The habitual substitution of wines, malt liquors, etc. for water is pretty sure in the long run to result in evil, in the majority of cases. For, in the first place, where pure or undiluted wine is drunk the individual is not disposed to take enough to supply the system with the requisite amount of fluid, and if he should everything is upset by the pernicious effect of the contained alcohol. Beer, though containing less alcohol, is open to the same general objections. It should never permanently, or for any lengthened period, be allowed to take the place of pure water. All these beverages are unnatural solvents; besides water they contain many ingredients intolerant to most alimentary canals. Especially is this true in those persons already suffering from deranged digestion.

Water taken at meals in quantities sufficient to satisfy the thirst acts only beneficially. Indeed, an excess will not hurt; for it is quickly absorbed, and, increasing the blood pressure, favors digestion by thus inducing a freer flow of the juices. It is a digestive agent as well as a food. By the liberal use or water as a beverage, the feces are rendered of proper consistency, the intestines maintain their normal activity, and constipation is avoided. The passage of from thirty-five to fifty ounces of urine each day, the result of the ingestion of pure water, tends to keep the kidneys and urinary passages clear of concretions and morbid changes, and with the skin and lungs equally active, the bodily house is well swept. The same result is impossible with artificial beverages. He who stints himself in the drinking of water is dirty inside—FOWLER, *Dental Office and Laboratory.*

THE BLOOD-CORPUSCLES AND THE LIVER.

In health, as is now well known, the effete red corpuscles are broken down in the liver, a great diminution occurring in the number of corpuscles found in the portal vein—a diminution which, during active digestion, is often as great as from 1,000,000 to 2,000,000. The effete hæmoglobin thus brought to the liver is, under ordinary circumstances, converted into pigment and urea; and, as the recent experiments of Dr. Noel Paton show, any increase of hæmolytic action resulted in an increased formation of urea and an increased amount of pigment in the urine.—*The Lancet.*

DRUMINE.

A new anæsthetic has been discovered in Australia. It is called drumine, and is obtained from the Euphorbia Drummondii. It is local in its action, and has certain advantages over cocaine, which is now so extensively employed for local anæsthesia. Its effects are as yet not sufficiently understood to warrant the acceptation of all that is claimed for it; but it will doubtless be investigated further, and its efficiency and value be more thoroughly established.—*Science.*

CONDUCTOR'S DEPARTMENT.

PROFESSION OR SPECIALTY. ?

Dentistry—a specialty or not a specialty of medicine, seems to be the topic uppermost in the minds of reading and thinking men concerned in dental theory and practice; and not a few of those who make no pretentions to the discussion of such subjects have become interested lookers on, and sooner or later are bound to take sides on the one hand with dentists as specialists, or on the other with dentists as members of a distinct and honorable calling. This matter will not down, as evidenced by its incessant recurrence *ad nauseam* in society discussions and dental publications, and the sooner we arrive at definite conclusions as to what some are pleased to term our "status" the better for us as individuals and as members of a great and influential factor of civilized community.

Since the first reading by its author at the late meeting of the New England Dental Society, "Dentistry not a Specialty of Medicine" has been in demand wherever rumor had carried the news of its enthusiastic reception; and at Rochester, New York, Brooklyn and Philadelphia, it has been heard and discussed, its propositions assented to, if not endorsed, and the ground taken pronounced good not only to stand upon but to fight from, until this great body learns of and for itself what medicine and the public have never questioned, that dentistry is a calling—admittedly composite—in and of itself, and abundantly capable of standing on its own legs and alone, without stick or stone of support from other callings, except such as itself sees that it needs and has the brains and strength to appropriate and fashion for the accomplishment of its own ends.

From its very inception dentistry has aimed at distinctiveness as a calling. Harris saw and felt this, and gave it shape when he founded the Baltimore College of Dental Surgery, and coined a distinctive degree. These were the first outward signs of professional aspirations on the part of the progressive men then in our ranks, and from them have grown and developed our system of schools, instruction, periodicals and societies—local, state, and national. A body capable of such things is too great to even think of attachment to a profession that has in its ranks an element that deplores the strong tendency to further specialization and the complications and disruptions that such measures must sooner or later surely lead to. Already cut into many parts, with every prospect of a further multiplication, dentistry is neither wanted nor needed as an addition to a body that has all it now can do to keep itself within the necessary confines of individual existence.

It therefore becomes dentistry to look out for itself, attend to its own wants, and prepare for the proper handling of its own specialties, a number of which are well under way with others gradually taking form, in not only the dental mind, but that also of the general public, which is quick to discern the fitness of things and act according to its discernment.

In presenting this subject for consideration and discussion, the author of the paper in question has done dentistry a much needed service; and it is well that it emanates from a man of cosmopolitan reputation as a member of the dental professon. Others have talked and written with the same object in view; but for reasons more or less obvious nothing has ever come of their effort, unless " Dentistry not a Specialty of Medicine" may be regarded as its focalization and authoritative proclamation to the world.

CALL THEM OUT.

The editor of the *Dental Record* says: " It is a notable fact, that, as a rule they who occupy dental appointments at general and special hospitals communicate very little, too often nothing all, either to our periodical literature or to our societies. This ought not to be. Dental surgeons at hospitals have opportunities for observation that are not presented in private practice. To them much is given and more is expected and required.

There are not a few dental college professors and demonstrators on this side, who, were they to appear in print more often, could add materially to that kind of knowledge that the profession stand much in need of. The profession certainly has a claim on them, and that claim is not fully met in theoretical and practical teaching in the schools. "Out-door relief," like the poor, should always be with them.

A DENTAL CONGRESS.

The International Medical Congress has been declared, and notwithstanding the unsatisfactory state of affairs a year or more ago promises to be a success. From patriotic motives alone every American should be concerned directly or indirectly, and every possible aid rendered to make the occasion and the event memorable in national and as well as medical annals. Dentistry will be represented by its medically qualified members and their invited guests, and a good showing of work in and by the dental profession may be confidently looked for in the section of oral and dental science. The invitation to dentists medically qualified was of course issued in good faith, and in the same spirit accepted by many, not a few of whom are representative men. So far so good. Let this work, now that it has been begun go on, but let us not lose sight of the further fact that a dental congress will be held in the not distant future, and that it will be as distinctive as possible in its every feature. To this end, or to be more accurate, to consider the feasibility of the project, committees have been appointed by the New England dental society, the Chicago dental society, the Vth, VIth, VIIth, VIIIth (in convention), and Ist district societies of this State, the Philadelphia county dental society, and for aught we know, others whose doings have not reached us. That something will come of this combined interest and effort is a foregone conclusion, and that it will be a dental congress—a congress of dentists practicing dentistry seems to be quite as conclusive. The developments of the next few months will be watched with unusual interest.

NEW DENTAL SOCIETY.

The *Southern Illinois Dental Society* was organized in East St. Louis November 23d. The southern portion of the State was well represented from all the corners, and a lively interest shown by all present. The officers for the ensuing year are as follows:

President, Dr. C. B. Rohland; Vice-president, Dr. S. W. Prichett; Secretary, Dr. D. W. Eutsminger; Treasurer, Dr. N. W. Carter.

Executive Committee, Dr. J. J. Jennelle, Dr. J. G. Dixon, and Dr. E. L. Spencer.

The first regular meeting will be held in Duguoin, commencing on the first Tuesday of April, 1887.

MEETING OF NEW SOCIETY.

The Eastern Illinois Dental Society will hold its first annual meeting at Paris, Ill., the 3d Tuesday in March. The officers are: President, Dr. Dwight, of Danville; Vice-president, Dr. Shafer, Champaign; Secretary, Dr. Shuriff, Danville.

A JUST TRIBUTE.

Dr. F. P. Abbott, of Berlin, is dead. No better tribute to a man of his character, standing and ability, could be well penned than that by Prof. James Truman in the *Dental Cosmos.*

"THE REAL CURE."

In the *Dental Record* of October, Surgeon-Major Beattie anticipates the question of the hour on this side of the Atlantic by proposing as "the real cure," that all doctors be dentists, and all dentists doctors. Perhaps the major is not aware of the fact that all dentists in America are doctors—have been since the founding of the Baltimore college of dental surgery. There is no reason, however, why we should not extend to other doctors the right hand of fellowship in their honest effort to become dentists.

"AMERICAN SYSTEM OF DENTISTRY."

Because I was identified with the project of a Cyclopædia of Practical Dentistry—had read a paper advocating such a work before the Dental Society of New York, in 1876, and subsequently was engaged in taking active but mistaken steps to forward that project; and had written a letter addressed to the members of the VIIth and VIIIth District Dental Societies of New York, giving general reasons for the failure of the enterprise, which was read at their joint meeting in Rochester, October, 1884—you have invited me to write my impressions of the first volume of that phenomenal work, *The American System of Dentistry*, edited by Professor Litch, and published in superb form and dress by Lea Brothers, Philadelphia, a copy of which you gave me sometime ago in Rochester to bring home and examine at my leisure. I interpret your wish to mean, in reality: To what extent, judging from the comprehensive, exhaustive, and accurate character of the first volume will the whole work, when completed, be likely to supply the place of a cyclopædia, and so fulfill the promise of the prospectus?

The subject of the dental cyclopædia ceased to have any personal interest to me with my letter to the VIth and VIIIth District societies; and for much longer period not one that I knew of in the profession to which I once had the honor to belong, had shown that he even remembered a project that had died of inanition. The few who had favored it doubtless misjudged the temper of the profession and failed to discern truly the real want as then manifested in nearly unintelligible ways. But the men of Philadelphia, with keener eyes sharper sagacity, and an equal wisdom, set *quietly* to work, and in less than ten years have produced a grand *system*, big enough, and good enough, and handsome enough for a monument (which doubtless it is) to mark an epoch in the history of dentistry! Dentists will be satisfied with it and be proud of it—they *must.* It is sure to be precisely what the student needs to put and keep him in the right track; and the few who will have need now and then to seek for matter not included, and perhaps not referred to in its pages, certainly will not be any worse off than they have been, while the profession at large will receive incalculable benefit.

Nevertheless, I retain old convictions unimpaired; and to me the function of the cyclopædia differs from that of a system, however exhaustive of its subjects, about as much as the distinction conveyed in the expressions *ex-abundantia gatherum* and *ex-cathedra.* One implies an *omnium gatherum*, the other a *selection* from a mass of material of that which can be wrought into a coherent whole.

Not only may system be defined as an agreement of different objects by some rule, but it will be found that the rule is arbitrary or not according to the number and clearness of the facts or accepted theories entering into its composition, as against that (in science) which is undecided or unknown. If this or some such definition holds, it follows that there are limitations implied in systematized work which are not enforced in building a cyclopædia.

And, no doubt, the editor of a series of treatises constituting a system, bears a heavier burden of responsibility than the editor of a cyclopædia, to make close and accurate discriminations between that which is available, and that which is not strictly to his purpose. Yet, to me, one of the conspicuous merits of the first volume of *The American System of Dentistry* is, that it was not *over*-edited—possibly for the sake of the cyclopædic character to be given it. In fact, the editor apologetically says in his preface: "Upon certain points in histology, pathology, and therapeutics, some divergence of views will be noted The editor has not sought to enforce absolute harmony of doctrine, or assumed to commit the work to a partisan advocacy of either side of questions which are still *sub judice.* Recognizing the fact that the profession at large still differ upon many questions of great although not vital importance, and that in practice the same end may be attained by widely divergent means, he has deemed it the wiser course to allow freedom of statement to all, sure that at last the truer knowledge will prevail."

If there seem to me great and probably insuperable difficulties in the way of giving the characteristics of the cyclopædia to any system which treats almost exclusively of subjects in their *direct* relation to science, as this first volume does, how much more must they be enhanced in later volumes which will treat of the *indirect* relations to science of applied dentistry, as an Art—three quarters of which doubtless it still is!

Of one thing I am quite sure, that no system, however complete, can supply the place of the cyclopœdia, simply because neither will fulfill the the function of the other; and yet I believe that while a compendious system might be wrought out of material taken from a cyclopædia, the converse cannot be true that a system will ever furnish all the matter required for the cyclopædia. The *Index to Cosmos*, and the *Index to Dental Literature, Periodicals, and Authors*, are yet as suggestive of yet unsatisfied wants by the profession, but lame, halting and tantalizing from their necessary limitations.

Very Respectfully Yours, RUSH MCGREGOR.

Summit, N. J., Dec. 24, 1886.

STATE MEETING.

Let every man in the state get ready for the coming meeting of the State Society at Albany. Everything is progressing famously, and one of the largest and best meetings in the history of the society may be confidently looked for.

THE PERRY SEPARATOR AS A NERVE STRETCHER.

Some time since Dr. J. S. Dodge called attention to the wedge, etc., as an aid in mitigating pain in sensitive teeth, suggesting nerve stretching as an explanation of the phenomenon. Since then we have repeatedly noticed the good effects attending the use of Perry's separators, very sensitive teeth losing their sensitiveness almost immediately; and this takes place with or without the rubber dam, thus weeding out the possible explanation of gradual drying of the cavity where the dam is used, though that materially assists.

DEAD.

CHESTER ALAN ARTHUR, ex-President (21st) of the United States, November 18, 1886. Aged 56 years.

PELLETS.

The *Dental Practitioner* wound up with the December ('86) number.

That humorous fellow, the kicking patient, now speaks of his doctor's bill as "pillage."

The proceedings of the American Dental Association, a volume of 161 pages, is just out.

Corns, bunions and teeth are said by a western paper to be much worn in some places as necklaces. What places?

Dr. N. B. Sibley, of Canal, Winchester Co., O., has a little patient of eleven years with completely erupted third molars.

The *Dental Office and Laboratory* takes on the popular book form with the January issue. Dr. Theo. F. Chupein edits it.

We are indebted to Dr. Theo. G. Lewis of Buffalo, for copies of the *Journal of the Society of Arts* and *English Mechanic.*

Read Kingsley's paper in the *Independent Practitioner* for January, and Howard's in this issue of the ODONTOGRAPHIC JOURNAL.

The Minneapolis Dental Society has issued a handsome programme of work for the year. Up there the best is none too good.

For full particulars of the recent joint meeting of the four district societies of the state, see Dr. C. T. Howard's report on another page.

The Transactions of the Dental Society of the state of New York are in the hands of the district secretaries. Jog them for your copy.

A typographical error in the programme of the eighteenth anniversary of the First society came very near converting our friend Dr. M. L. Rhein into a national drink. Fortunate escape—congratulations.

The *Dental Advertiser* for January is an unusually good number. The *Archives of Dentistry* also makes a good showing in the December issue.

At the October meeting of the four district societies, our friend Barrett took another whack at American dental colleges. Perhaps "It's English."

The *Dental Review*, edited by Dr. A. W. Harlan, and several associates, and published at Chicago, began its work with the November issue.

By the way, what has become of the English affair of a few years since—the "Society of General Surgeons Practicing Dentistry?" Does it still live? Is it well?

A lady visiting friends who believed in and practiced cremation, going to one of the family urns for tooth powder, learned later that she had brushed her teeth with "Aunty."

The coming of the *Western Dental Journal* is announced in several of our contemporaries. Dr. J. D. Patterson, of Kansas City, will edit, and Pierson & Co. publish it.

The Florences—not the players, but the brush men—have recently put out a toilet set for dental offices. It is given as a premium on conditions mentioned in their advertisement.

Those who bind the ODONTOGRAPHIC JOURNAL will find with this issue the title page and table of contents of Volume V., overlooked at the time, and repeatedly inquired for since.

The Microscope has changed hands and place of publication. The whole business of editing and publishing is with four M. D.'s of Detroit. In matter and looks it is much improved.

Caulk's *Dental Annual*, Number 5, 1886–7, is a book that every reading dentist should have in his library. Societies, patents, laws, etc., find a place between its covers. It costs fifty cents.

We knew it would come, like all good things, in due season. Here it is, the address on a package of pamphlets: "Dr. Edward S. Line, editor *Dental Cosmos*, Main street," etc. "And yet they say—Not so."

No. 1 of volume II of the *Quarterly Bulletin of the Clinical Society* of the New York Post Graduate Medical School and Hospital is an exceptionally good number. It contains much of general interest to dentists.

The *Ohio State Journal of Dental Science* (How even the names of its periodicals point to dentistry as a profession), says Dr. Geo. W. Keely has taken up "Irregularities of the Dental Arch" as a "specialty." Good.

The sixth annual dinner of the Chicago Dental Society was given at the Hotel Richelieu, Chicago, December 14, '86. The committee in charge consisted of Drs. A. W. Harlan, E. E. Cady and L. L. Davis. A great time was had of course.

Blackiston's *Physicians' Visiting List* contains much information that dentists might profit by. Every year sees it improved, both as to printed matter and convenience in use. For details the reader is referred to the publisher's advertisement on another page.

Dr. T. S. Hitchcock, of Seneca Falls, N. Y., has a clean bound copy of "Dental Science," 1839, which he will dispose of to the highest bidder. It has a fine portrait of John Greenwood, numerous cuts, and a list of dentists practicing in the United States at that time.

Not many years ago, the man who used tin and gold in the same cavity was liable to have that combination charged to his crankiness or his cupidity. Now it would seem to be the proper thing for almost any man to do and have the same charged to his good sense. Thus do we change.

Dr. D. F. Ogden, for some weeks previous to his departure a guest of Dr. E. Parmly Brown, has gone to Tokia, Japan. A much-travelled and genial man, skilled as a dentist, and emenently successful wherever he has been, he cannot fail of attaining the object of his visit to the country of the Mikado.

The First District society's three day's meeting begins Monday the 17th, and bids fair to eclipse all previous efforts, even the big meeting of a year ago last month. Papers, clinics, demonstrations, and a banquet, will be the features of the occasion. Drs. Walker, Northrup and Francis are the executive committee.

Science mentions as a leading paper in the published proceedings of the Hamilton, Ont., Scientific Association, "Burlington Bay and the City Drainage," by Dr. C. S. Chittenden. It is spoken of in connection with two others as "based on original investigation," and a material addition to the world's stock of knowledge.

The matrix is a good thing if used intelligently. One point at least should never be lost sight of—the adjustment of the matrix so as to allow the filling to project beyond the cavity. This is absolutely necessary in order that a flush finish be obtained. Jack's matrices are formed with special reference to this point.

Dr. Garrett Newkirk speaks strongly in favor of eugenol as a dressing for pulp canals; it "penetrates, saturates, mummyfies, and stays." Oil of cloves is sold for eugenol, between which there's as much difference as between oil of eucalyptus and ordinary turpentine. Get Merck's and you get what you want and pay for.

In performing "Younger's Operation," do not, as suggested by Dr. W. H. Rollins in the December *Dental Cosmos*, use the tubular knife to remove the soft tissues. Do not remove such tissues at all, but slit the gum with an ordinary lancet, peeling it from the bone sufficiently to admit the largest drill or reamer required to form the socket. On the soft tissues largely depends the success of the operation.

The *British Journal of Dental Science*, of October 15, '86, has been sent us, and we find it interesting indeed. It contains fifty pages of reading matter—thirty-five from American journals, and fifteen from home and other sources. Of the fifteen pages, seven are devoted to the report of an attempt to freeze out a poor devil who wears an American "D. D. S.", which was done, plus "twenty shillings and costs."

The October meeting of the Vth, VIth, VIIth, and VIIIth districts dental societies was one of the largest, and certainly the most valuable and interesting ever held in Western New York. The number and character of those in attendance, the quality of the papers presented, the special features of the meeting—Dr. Kingsley's lecture, Dr. Younger's clinic, the banquet and speeches—made it an occasion long to be remembered. The whole affair was engineered from the first by the Seventh society's business committee—Drs. Frank French and B. G. Saunders—and to them belongs the glory that tops success.

My dear fellow, don't get wrathy because it is not conceeded on *all* sides that you are a medical practitioner. You are eminent in dentistry as a dentist, a fact conceeded by everyone as well without as within the dental profession; but as a medical practitioner, with or without an "M. D.", you don't stand toe high. When it comes to handling a pulp or crowning a molar you are perfectly at home; but when a case of stomach ache pops in, you are at a loss to know whether to prescribe for wind or water. And why should you? As well and quite as successfully might your medical friend attempt the work which you claim as distinctively yours.

He is known by older dentists, at least, all the way from Philadelphia to Cleveland,—Dr. L. S. Hotchkiss, now of West Haven, Conn. Only recently we were shown a letter in which he recalls many of his former experiences, with Western New York dentists especially. Some of those he asks about are dead, some have gone to other parts of the country, some have grown poor, a few rich, others wicked. Dr. J. S. Walter is in Oregon, his brother, L. D., is here. Dr. French is asking, "What caused it?" Dr. Leyden is serving the first year of a three-years' term as county clerk, and "Dr." Davis is vulcanizing in a dry steam water bath. Yes; and Dr. Bristol, of Lockport, is rolling out of bed a dozen times a night to jot down an item of half a century ago, and Dr. Southwick of Buffalo is perfecting a scheme for yanking the dangerous classes out of the world by lightning.

Without intending to do so, we have given him about all the information asked of another, hoping it may do him good. And now what is there to prevent this venerable distributer of Waterbury teeth, from giving the readers of the ODONTOGRAPHIC JOURNAL a letter or two on dentistry as he found it when he passed in some places as a drummer, and in others as a preacher.

THE
Odontographic Journal

A DENTAL QUARTERLY.

J. Edw. Line, - - - - - - - *Conductor.*
George P. Davis, - - - - - - *Publisher.*

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1886-87.

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1886-87.

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THE

Odontographic Journal.

Volume VIII.—*April, 1887.*—*No. 1.*

HOW TO STUDY THE BIOLOGY OF A WATER SUPPLY.

BY GEO. W. RAFTER, M. AM. SOC. C. E.

[Read before the Section of Microscopy, Rochester Academy of Science.]

Other things being equal, there is in every community having a public water supply a relation between the degree of relative purity of such supply and the public health. Indeed, it may be broadly stated, that in any community possessed of a water supply of a high standard of purity, there will exist a lower annual death rate than would exist if the standard of purity of water supply were materially lower.

No argument is necessary then, to establish the general proposition that information relative to the biology of a public water supply is of vast importance, both to individuals and communities, and a study having for its object the solution of biological problems may be safely counted as worthy of our best efforts.

It is purposed to give in this paper a brief account of some of the methods of work to be followed in such a biological study as the Section is about to undertake, together with a few hints as to desirable lines of study.

First as to the tools. These are the compound microscope, fitted with the following list of objectives: one inch, one-half inch, or four-tenths, one-fourth and one-eighth. In my experience, the one-half and the one-fourth inch are the most useful. My own, which are in every way satisfactory, are a one-half inch Gundlach, aplanatic of 50° augular aperture; and a one-fourth inch Bausch & Lomb, professional of 110° angular aperture. I prefer for this work these moderate angled objectives to those of wider angle. They have better working distance than the wide angled lenses of recent make. I also use a two inch, one inch, one-fifth inch and one-eighth inch, but the use of these latter is infrequent compared with the two above mentioned, and I may say in passing, that any member of the Section who has only one-half inch and one-fourth objectives need have no fears but that he may be able tò contribute his quota to the work in hand.

While I am thus somewhat radical in expressing my preference for moderate angled objectives for ordinary work, I deem it but fair to say that for the highest class of biological work wide angled objectives are nearly indispensible. For any immersion objective above one-sixth inch focal distance, my present impression is that I should purchase those of large angular aperture. There is, however, in all such objectives, a considerable sacrifice of working distance to angular aperture, so that the specific use to which an objective is to be put must to a great extent determine just what to purchase. Of one thing we may be certain, that the very wide angled immersion lenses require a perfection of movement in the microscope stand and a delicacy of manipulation, which adds considerably to the amount of time required to complete an examination,* so that for the working microscopist to whom time is of value, the question of just what shall be the limit is an important one.

Of eye-pieces one is indispensible, and two or more are desirable. Where only two are purchased, they should be one of an inch and one of an inch and a half focal distance. The Huyghenian eye-piece gives somewhat clearer definition than the periscopic, but the periscopic has the advantage of doubling the field. A fairly complete battery would consist of a one inch periscopic in addition to the two Huyghenian eye-pieces above suggested.

The catalogues are filled with life-cages, growing and culture cells of divers and various sorts, and the beginner in biology is very likely to conclude that considerable expenditure is necessary for apparatus of this sort, My experience, after trial of the various life-slides and life-cages, is that for ordinary examinations a plain slide, with

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*For *very* high power objectives cover glasses, even of the thinest glass are too thick, and ordinary talc split into thin laminæ may be used. W. Saville Kent, in his Manual of the Infusoria, speaks of using laminæ of talc of such extreme tenuity that they may be blown away with the lightest touch. With such films Kent says the investigation of the Infusoria, with 1-16, 1-25, or even 1-50 inch objectives, becomes a comparatively easy task.

a ring of cement forming a shallow cell, covered with a cover glass, is on the whole preferable. Holman's syphon slide and Holman's syphon life-cage are of use where it is desired to observe the same object continuously for several days. Their expense, however, is considerable, and fairly satisfactory results may be gained with the following device, which has the merit of costing almost nothing. A plain glass slip is taken, and to one side of it two, three, four or more thicknesses of chemical filter paper are pasted, the number of thicknesses depending upon the depth of cell required. The cell is made by cutting out the center, either round or square, according to the taste or fancy of the operator. In this cell is deposited the organism which it is desired to study. The placing of a cover glass, and the securing of it with a little cement, completes the operation so far as the construction of the growing cell is concerned. The cell is now placed upon the stage of the microscope and supplied with water by a rubber tube acting as a syphon from a jar standing on a shelf above the stage of the microscope. The supply of water is controlled by a brass cock placed at the lower end of the rubber syphon tube, set so as to allow water to drop very slowly upon the paper composing the cell—just outside the edge of the cover glass.

In preparing such a cell care should be taken to cement the several layers of the paper together at the inner edges in order to prevent the more minute ojects from passing in between the layers. In useing it, the slide should be dipped in water, thoroughly wetting the paper before filling the cell, and the delivery of water from the syphon should be at such a rate as to keep the paper constantly wet, just supplying the loss from evaporation. The best results will be obtained from such a cell by having the microscope set vertical. Filter paper is used in its construction in order to insure that the paper contain nothing likely to kill the object whose life-history it is desired to study. For deeper cells the best quality of white cotton blotting paper* may be used, the precaution having been taken to soak it for several days in frequent changes of pure water. For low power objectives this cell may be constructed of two thin slides, with a layer of blotting paper between them, the slides held in place by rubber bands at the ends.

†Recklinghausen's growing cell is stated by Frey to be an efficient device for preventing the evaporation of fluids. It consists of a

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*Alling & Cory keep such a quality of blotting paper, which is claimed to be entirely free from chemicals, and composed of nothing but pure cotton fiber.

†Frey, on Microscope and Microscopical Technology. Translated by Cutler. Wm. Wood New York, 1880. Page 90.

glass ring cemented to an ordinary slide, forming a cell, in which the organism to be examined is placed in a little water. Blotting paper is folded over the edges of the glass ring, and a tube of thin rubber slipped over this and connected with the objective, being held in place by compression bands. Around the outside of the glass cell several thicknesses of moist blotting paper are wrapped, and to these additional moisture occasionally added.

For studying the life-history of very minute organisms, an efficient cell may also be made by inverting a cover glass over a glass cell, with a little water at the bottom, the organism to be studied being contained in a drop of liquid on the under side of the cover glass.

The moist chamber used by Dallinger and Drysdale, in their investigation of the monads, is of interest and value,* and illustrations of it can be found in Kent's Manual of the Infusoria.

Maddox's growing slide is also worth trial. Carpenter is a convenient reference for a description.†

Weber's annular cell is an American invention, and I think a valuable contrivance, and worth trial.‡

For assisting the illumination, I consider a good sub-stage condenser indispensible, and for this purpose the large sub-stage condenser of the Abbe form is the best. It admits of the greatest range of adjustment, without loss of time, and when it is desired to examine an object, under all conditions of illumination, this is a matter of considerable importance. This condenser is provided with a swinging ring carrying diaphragms of various apertures. The blue glass which accompanies it for furnishing monochromatic light, when working by lamplight, is also of value.§ By its use the objectionable and trying yellow glare of lamplight is entirely obviated, and my experience is that a considerably larger amount of work can be done without over-fatiguing the eye, than can possibly be accomplished without it. The value of the condenser may be readily shown by a trial of it on one of the test diatoms, and probably the most decisive test will be by resolution of the *Pleurosigma angulatum*, with a one-fourth of medium angular aperture. Such an objective of 110° will only make the resolution, without the

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*This cell was originally illustrated in *Monthly Microscopical Journal* for March, 1874.

†"The Microscope and its Revelations," by Wm. B. Carpenter, Sixth Edition, Page 145. Originally described by Dr. Maddox in his paper on Cultivation of Fungi, in *Monthly Microscopical Journal* for 1870, Vol. III.

‡See Carpenter, as above, Page 147.

§The opticians also furnish a blue glass mounting for sub-stage, which is adapted to any microscope without the condenser. A blue glass chimney for the lamp may be made to give substantially the same results.

condenser, when the light is considerably oblique. Moreover the resolution is not made instantly, but, even with a fairly expert operator, will require some expenditure of time in manipulation. With the condenser, on the contraiy, such an objective will resolve the test instantly, or at any rate, as nearly so as one can rack the condenser to its proper position in the sub-stage, and this, too, with the smallest diaphragm in place, so that the resolution is in reality made with truly central light.

All microscopists understand the advantage of perfect resolution by central light, and that oblique light has no value except when central light fails to effect the resolution. We gain, therefore, by use of the condenser economy of time and more truthful views of the object under examination.*

The above are the more important tools to be used in a study of the kind contemplated. For dissections, knives, needles, watch-glasses, tweezers, a dissecting microscope, and other accessories, will be required. Should section cutting be gone into, a microtome and additional accessories become necessary. I have described above what I consider indispensable for the work in hand. Each member can elaborate as his purse and inclinations seem to justify.

When it is desired to collect samples from the mains of a public water supply, the simple method of fastening a single thickness of fine muslin over an ordinary cock and allowing the water to flow freely will answer every purpose. It is necessasy to allow the water to flow full size of opening in order that the various suspended objects may be carried along and brought into the filter, and two hours of such flow will ordinarily be sufficient. For cleaning the specimens from the filter it should, after removal from the cock, and after turning wrong side out, be either dabbled in a small quantity of water contained in a deep dish, or washed off with an ordinary laboratory wash bottle. In this way the filterings of a number of hours may be concentrated into an amount of water not more than enough to half fill a medium sized beaker. After standing for a short time samples may be selected, either from the sediment at the bottom, or from other portions of the liquid, depending upon what particular class of organism the operator may be looking for.

For methods of treating the sediment and, and for general methods of examination, the members of the Section are referred to McDonald's Water Analysis,* where excellent instructions bearing on the matter in hand may be found. It may be remarked that this book is probably the best one bearing on this part of the work that the members can obtain. While it is confessedly elementary, it is still true that what it does contain is to the point and valuable.

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*For hints on the use of the condenser see "Manipulation of the Microscope," by Edward Bausch, Member of the Academy.

In an examination of the sediment, organisms are frequently encountered, so nearly transparent, that the eye fails to discern the structure. In such cases the examination may be materially assisted by the use of some staining reagent, which added to the sample, has the effect of bringing out the hidden structure. For such purpose the various aniline dyes are useful, though probably hæmatoxylin is most frequently used. For the infusoria, a solution of iodine, in iodide of potassium, and osmic acid have both been successfully used. They color the structure leaving the cilia extended.

The application of such reagents is further of use from the fact that living objects fail altogether to take stains, and we are thus frequently, in uncertain cases, able to assist judgment as to whether a given object belongs to the Protophyta or to the Protozoa. The evidence may, however, sometimes be of a negative character and when this occurs we are still able by such use of staining reagents to ascertain whether or not the unknown organism is fairly classifiable as living matter at the time of making the examination.

The use of first quality objectives, however, by reason of their superior definition renders the application of staining reagents less necessary in this connection than is the case with ordinary objectives.

Collections from streams, reservoirs, lakes, or ponds, used as sources or parts of public water supplies, will have to be made by different methods, and the particular method used will depend upon what it is desired to collect.

For fresh water algæ, the implements needed, in addition to long rubber boots, are substantially as follows :

First :—A small iron or tin ladle, two inches across, and provided with teeth for one-third of the circumference opposite the handle. The handle is a hollow ferule, and serves to attach the ladle to one's walking stick. The teeth are bent inward in order to catch masses of algæ beyond arms length.

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*A guide to the Microscopical Examination of Drinking Water, by J. D. McDonald, published by J. & A. Churchill, London. Price $2.50.

Second:—A small sieve is necessary for intercepting floating masses of desmids, etc.

Third :—A common iron spoon for removing thin layers of mud along the margins where the presence of desmids or diatoms is for any reason suspected.

Fourth :—An iron rake for bringing up samples from the bottom is of value. It should have enough strong cord attached to reach the bottom of the deepest body of water to be examined.

The above, with a number of bottles, a good pocket magnifier, and a strong jack-knife, will be all the tools required for collecting the fresh water algæ.[*] Indeed my own collections have thus far been all made with the help of a few bottles, a walking stick, a rake, and for objects at a distance on the surface, such means of reaching them as could be readily improvised on the ground.

[†]Mr Wolle's outfit for collecting desmids consists of four or five tin cans (tomato or fruit) one within the other for convenience of carriage ; ten or a dozen wide-mouthed bottles, and a ring net similar to that described below for collecting the entomostraca.

[‡]According to Dr. Leidy, rhizopods are best collected by the use of a small tin ladle, as above described. Instead of a walking stick Dr. Leidy carries on his collecting tours a jointed pole of two or three pieces, each about five feet long. The ladle, or dipper, is used by slowly skimming the edge along the bottom of the water so as to take up only the most superficial of the ooze, which is then gently raised from the water and transferred to a glass jar.

Dr. Leidy farther states that he has been most successful in finding rhizopods in the ooze near the shores of lakes and ponds, probably due to the fact that the ooze near the shores could be better seen, thus enabling the collector to get the desired material.

For government collecting expeditions, etc., fitted out without regard to expense, very elaborate dredging and collecting apparatus is usually furnished. I do not describe such apparatus in this paper from the fact that it has no relation to the work to be undertaken by the Section.

[§]The infusoria are the most widely distributed of any class of microscopic life. Infusions of every sort and kind, and waters of every degree of purity contain them. Even falling rain and dew provide a home for extensive series. Certain classes are only found in salt and brackish water, and others in putrid infusions. These may be at once excluded as beyond the limits of our present inquiry.

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[*] See the "Collector's Hand Book," by Johann Nave, translated and edited by Rev. W. W. Spicer. Published by W. H. Allen & Co., London.

[†] See Desmids of United States, by Rev. Francis Wolle, page 13 of Introduction.

[‡] Fresh Water Rhizopods of North America, pages 7 to 13 inclusive, are of great interest to the collector.

[§] Kent's Manual of the Infusoria, The Distribution of the Infusoria, page 107 and following.

Weedy ponds, or weedy nooks in reservoirs or lakes, and slowly running water, are the most favorable collecting fields for the species we are at present interested in. In such places one may profitably examine finely divided living plants for specimens of the more sedentary species, such as the Ciliata and Flagellata. Dead and decaying leaves in the water should be examined for colonies of *Vorticella* and *Euglena*. Certain of the entomostraca, as for instance, *Cyclops* and *Canthocamptus*, and the higher crustacean forms, *Assellus* and *Gamarus*, are likely to be covered with some of the parasitic species.

For the collection of the infusoria one needs most a dipping bottle and some means of reaching beyond arm's length, together with several small bottles to which to transfer the collections from the dipping bottle.

A dipping bottle, as used by me in my collecting trips, consists of an ordinary two ounce morphine bottle, fastened to the end of a walking stick by a strong rubber band around the neck of the bottle, with the end of the stick passing between the band and the neck. For concentrating the dippings, I have used a large-mouthed twelve ounce bottle, with two funnels, one of them small enough, when the stem is thrust through a small hole in the cork, to pass down into the body of the bottle in an inverted position. The mouth of this funnel is covered with a piece of light cotton cloth. The other funnel, which is larger, also has its stem passing through the cork, but in an upright position. The dippings are poured into the upright funnel, pass down through the stem of same into the bottle, where the inverted cloth-covered funnel acts as a strainer, allowing the water to flow up out of the bottle, but retaining whatever of microscopic life may have been brought up by the dipping.* With this apparatus I have on one occasion, succeeded in getting near the mouth of the Genesee river, at Charlotte, a fine catch of the splendid rotifer, the *Conochilus volvox*. I have found it of use on several occasions where the particular organism desired existed only in small numbers, and sparingly distributed through a considerable volume of water.

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*For illustrations of this device see Practical Microscopy, by Geo. E. Davies, second edition page 130, chapter on Collection of Objects.

The rotifera may be collected by means of the collecting bottle and concentrating apparatus just described. They are likely to be found in all varieties of water, and a formal enumeration of their habitats would transcend the limits of the present paper. The members are referred to *Hudson and Gosse's new work for detailed information on this point.

Certain worms of the class *Annulata* are indicative of badly contaminated sewage waters. Where it is desired to collect and preserve them for purposes of comparison, they may be found in any stream receiving sewage, and are easily obtained by use of simple dipping bottle. The open streams receiving sewage in the eastern part of the city have afforded me several forms.

†For collecting the entomostraca from ponds, lakes, and reservoirs, the dipping net is indispensable. This is made by an iron ring, about one foot in diameter, attached by a strong ferule to a pole ten to fifteen feet in length. The iron ring has a bag fitted to it, (a flour sack answers every purpose) and the pole should be strong enough to allow of lifting some considerable amount of water. This net may be used not only in shallow water, and among weeds, but also for towing behind a boat in deeper water.‡ It is emptied by allowing it to drain through the meshes of the cloth, and then, when only a small amount of water is left in the bottom, transferring the same to a wide-mouthed bottle by quickly inverting the bag.

For collecting from considerable depths, I suggest that a trial be made of the collecting bottle§ designed by H. F. Atwood, Member of the Academy. Judging from the illustration it appears to have some excellent points, but I have no experience as to its practical value in actual use.

The above covers the principal methods and appliances for collecting. Other methods will, no doubt, suggest themselves to the members as they progress in biological studies, and in concluding the subject of collecting, I have to offer the suggestion that any scheme for work which the Section may enter upon, have included, as an integral part, several field days on which the members sally forth, making for the day a business of collecting. Our studies become in this way a source of relaxation and pleasure of the highest value.

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*The Rotifera, or Wheel Animacules, by C. T. Hudson, assisted by P. H. Gosse, London Longmans, Green & Co., 1886. Chapter IV, on the Haunts and Habits of the Rotifera.

†See A Final Report on the Crustacea of Minnesota, by C. L. Herrick, Assistant in Zoology, Chapter IV, on Collecting, Preservation and Miscellaneous Notes.

‡For illustration of modification of this net, especially adapted for towing in deep water, see Practical, Microscopy, Chapter on Collection of Objects, above referred to.

§Illustrated in Catalogue of Bausch & Lomb Optical Company.

Farther, in concluding the subject of collecting, I desire to impress upon the members the importance of keeping a full and complete record of everything relating to each collection, as for instance, where it was found, and under what general and special conditions. Information of this kind will possess great interest when making a final judgment of the value of any given sample for sanitary purposes. For such a record I usually have with me several small blank, gummed labels, such as are used for slides. One of these is numbered and pasted to each bottle, being made to correspond with that of the entry in a small memorandum book, which completes this part of my collecting record. These numbers can be carried in a series through an entire season's work, and farther used for the record of the examination at home.

Having collected our material, it then becomes an exceedingly important question how to best preserve it for future reference. Much ingenuity has already been expended in devising methods of separating microscopic material from the various degrading contaminations gathered with the original collections, and much still remains to be done.

Diatoms and desmids are usually separated by methods depending essentially upon differences in the specific gravity of various objects. For detailed description of such methods, and the necessary apparatus, the members are referred to Nave's Collector's Handy Book, above mentioned.*

The smaller species of diatoms, when living, may be separated by placing the material containing them in a shallow dish, with a little water, and laying over them a thin cloth. The tendency to move toward the light, which seems to be inherent in all these minute organisms, will cause them to creep through the meshes of the cloth, appearing on the upper side, frequently in such quantities as to be easily scraped off with a thin knife, and of course entirely free from the degrading material. I have recently tried this method, as an experiment merely, and met with most abundant success.

The filamentous algæ can be cleaned by washing, but when in fruit this needs to be done with the greatest possible care, otherwise the operator is certain to lose that which he most desires to retain. Indeed, certain of them are so delicate, when in fruit, that the slightest disturbance will inevitably cause them to break up; and as a measure of safety it is often best to mount them without any attempt at washing. This becomes especially important when we consider that it is absolutely impossible to identify numerous species of fresh water algæ, except when in fruit, and as the fruiting season, with many species, is very short, extending over only a few days in some cases, we are obliged to accept one horn or the other of the dilemma, either to run the chances of losing that which makes certain the identification, or else to get into our mounts a little dirt. My own opinion is, we should accept the dirt in the case of the fresh water algæ as inevitable, and run no chances.

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*Also to Practical Microscopy, pages 138, 139-288-290. See also Article Diatomaceæ, in fourth edition of Micrographic Dictionary—Collection—page 252.

Until recently no satisfactory medium for mounting the fresh water algæ has been known, and even now there seems to be a chance for slight improvement. King's Fresh Water Algæ Fluid* has, however, the merit of preserving many species almost perfectly, and all species fairly well. Its chief fault is that the endocrome in some of the algæ shrink slightly, and unfortunately such shrinking usually has the effect of obscuring just the features one desires most to see. On the other hand, it preserves the chlorophyl perfectly, so that even after the lapse of years the green color remains as distinct as on the day of collection. Mr. King has recently stated† that desmids mounted four years ago are still as bright as when first mounted. This is an excellent test of the preservative properties of this fluid, as the desmids are on the whole the most delicate so far as the chlorophyl is concerned, of all the fresh water algæ.

The following is the formula for this fluid :‡

Camphor water	50.00 grammes.
Distilled water	50.00 grammes.
Glacial acetic acid	0.50 grammes.
Crystal copper chloride	0.20 grammes.
Crystal copper nitrate	0-20 grammes.

This should be filtered after solution.

The following preservative fluid, the formula of which was communicated to me by a correspondent, is very similar to Mr. King's and for many species works equally well :

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*Prepared by Rev. John D. King, 19 Quarry Street, Fall River, Mass.

†Private communication.

‡This is really Petit's formula, but it has acquired the name of King's Fluid in this country, from the fact that it was introduced by Mr. King, and first used by him in his classes.

Dissolve fifteen grains of acetate of copper in a mixture of four fluid ounces of camphor water and four fluid ounces of distilled water, add twenty minims of glacial acetic acid and eight fluid ounces of *Price's glycerine, and filter.

This fluid is said to answer well for preserving algæ in tubes, and for mounting.

The use of a fluid medium, however well it may preserve the distinctive features of the algæ, has the serious disadvantage that the mounts if not made with the greatest care are liable to leak, and this means of course the loss of the preparation. Mr. King has experimented with cements to meet this difficulty, and his Lacquer Cell and Finish† furnishes us with a tolerably safe remedy. With this cement thin cells are run on slides with a turn-table, and after drying the mounting may be proceeded with in the usual manner.‡

Mr. King's directions for mounting in fluids are as follows§:

(1) Allow the cell to harden perfectly. It can be hardened with artificial heat in a few hours.

(2) Bring the cell to an even surface with a fine file, or by warming and pressure with a smooth, flat metalic or glass surface.

(3) Ring the outer half of the flattened surface with King's White Cement.

(4) Lay on the cover and press it firmly to its place, and be sure that it adheres to the cell at every point.

(5) To seal the cell pass it two or three times slowly over the flame of a spirit lamp to soften it, then apply just pressure enough to the cover to imbed it slightly in the cell. To do this nicely may require a little practice.

(6) Finish with the same, or another color, to fancy.

It is a good plan to put a ring of the white cement around the edge of the cover before applying the final coat of lacquer finish, or, if preferred, a good finish can be made with the white cement alone.

Everything guaranteed if these directions are followed.‖

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*Bower's glycerine which is the standard article in this country will, I think, answer equally well. It is more truly neutral than Price's.

†For sale by the Bausch & Lomb Optical Company. The cements may also be obtained directly from Mr. King. Price 50 cents per bottle.

‡It will not answer to use either the ordinary alcoholic solution of shellac, or gold size for making cells to be used for mounting with this fluid. It will in time destroy such cells.

§These directions are intended by Mr. King to apply particularly to mounting in cells composed of his Lacquer Cell and Finish Cements.

‖For formula for King's cements, see Behrens' Guide to the Microscope in Botany, translated by A. B. Hervey, page 235-236.

King's Fluid, diluted with one-half water, answers well as a medium for mounting the infusoria.

Glycerine jelly is also an excellent medium for mounting many species of fresh water algæ. Indeed, Dr. Cooke* considers it on the whole the best. It is possible, however, that Dr. Cooke had never seen the Algæ Fluid above referred to. The glycerine jelly has the advantage of making mounts safe from the danger of leaking, but delicate filaments are badly distorted. I have, however, used it for nostocs with good results.

Mounting with glycerine presents some difficulties of technique, and I am able to present the following on glycerine jelly, and its use in mounting, from Mr. King, who is an expert in its use. Mr. King says :†

"I put up a jelly after Kaiser's formula,‡ with the improvement of a specially selected gelatine made from the swimming bladder of the sturgeon, that requires less glycerine, and is less objectionable than any other I have ever used. * * * It is a splendid jelly, and will stand hot weather without melting.

"As to my methods of using, I melt it on the slide, in the quantity needed to nearly fill the cell, placing the object where I want it, and taking off every air bubble that can be seen with the naked eye, after which it is put by and allowed to harden. I then melt a little of the jelly on the cover glass, breathe hard on the slide, turn the cover over quickly and put it on the object, being sure that no air bubbles are caught under the cover. I then put on a delicate clip, pass it over a spirit lamp till it warms enough to come to its bearings ; let it harden ; clean off the greatest part of the jelly with a pine stick sharpened, after which the slide is put into a dish of water and washed off clean with a small bristle point brush. The slide is then carefully wiped dry and finished."§

Mr. King suggests the use of his Lacquer Cell and Finish for glycerine jelly mounts, a suggestion with which I, after some little experience, heartily coincide.

In my own use of glycerine jelly, I have found it desirable to have the jelly one or two inches deep in a five or six inch test tube. This tube is stopped with a cork, in which is secured a glass rod about one-eighth of an inch in diameter, drawn to a blunt point at the lower end, and of such length as to reach just short of the bottom of the test tube. In mounting, I first place the object in position in the cell, and having warmed the jelly in the test tube, over the chimney of the lamp which furnishes illumination for the microscope, I bring with the glass rod a drop of the melted jelly upon the object. Air bubbles are removed and the balance of the operation proceeded with substantially as described by Mr. King. I find the use of the test tube less troublesome than the cutting of small pieces of the jelly as practiced by Mr. King, and the difficulty of getting rid of the air bubbles from the melted jelly no greater.

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*British Fresh Water Algæ, by M. C. Cooke. London. Williams & Norgate, 1882—1884.

†Private letter.

‡See Behrens', page 220.

§Additional hints on mounting in glycerine jelly may be found in Practical Microscopy, Chapter XIII, The Preparation and Mounting of Objects, and in Behrens' Guide to the Microscope in Botany, above referred to.

*Glycerine and glycerine jelly are also the most useful mediums for mounting the entomostracan crustacea. They work admirably for all the species included in the order Copepoda, but for the Cladocera they shrink the tissue unless it is first submitted to special treatment, namely: The crustacean should be instantaneouly killed with some reagent, which, while producing death, leaves the body in all its parts entirely unaltered. For this purpose osmic acid has been most used, but this is not entirely successful, due to the fact that it discolors the tissue.

Recently Prof. Hermann Fol has discovered that muriate of iron (ferric perchloride) produces not only instantaneous death, but a fixation of all the parts, with very little coloration or shrinkage.†

According to Herrick, whom, however, I do not understand to have himself tried this method of fixation, the alcoholic solution is diluted to about two per cent. and applied to a small quantity of water in which the animal is swimming. The water is poured off and the crustacean washed with seventy per cent. alcohol, to which a few drops of nitric acid may be added to remove the iron salts.

I have experimented with this method of treating the crustacea, and consider it on the whole a fairly satisfactory method of fixation. By way of illustrating its value I submit to the Section a few mounts of entomostraca so treated.

Osmic acid is highly recommended by Kent‡ for killing and fixing the infusoria. By its use he says they may be preserved as naturally as though living, and the matter of securing permanent mounts of nearly all types of infusoria is a mere question of patient manipulation. Coloring reagents may also be used in connection

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*See final report on the Crustacea of Minnesota, by C. L. Herrick, above referred to.

†See report by C. L. Herrick, as above,

‡Manual of the Infusoria, above referred to. Preservation of the Infusoria, page 113.

with the osmic acid, so that all the structures, such as cilia and flagella, the internal endoplast, and in Euglena the colors also are preserved, "the animalcules, excepting for the abscence of motion, being scarcely distinguishable from the living organisms "

I have used the osmic acid for fixing bacteria, and in experimenting with the entomostraca, but have no knowledge derived from experience of its value as a preservative for the infusoria.

For the killing and fixation of hydra, Huxley and Martin* recommend first placing the animal in a small quantity of water, and after the hydra has extended its tentaclés, adding boiling water.

I have used for this purpose the muriate of iron as recommended by Fol for the crustacea, and was successful in killing the hydra in an extended condition, but the structure soon broke down, so that, from present information it appears that the muriate of iron cannot be used where permanent preparations of hydra are desired.

The rotifera may be mounted in glycerine jelly, and for killing and fixing them I have found both osmic acid and muriate of iron to work well.

In connection with the general subject of the biology of water supplies, there remains to be briefly discussed certain plants, of which a knowledge of the life-history becomes a matter of the greatest interest, and especially is this true when we consider that their presence under certain conditions is liable to render waters, ordinarily pure and wholesome, so far as taste and smell are concerned, nearly unbearable. The odors and tastes, which various water-supplies, both in this country and Europe, have at times taken on, have been in many cases traced to the presence of an alga in some form of decomposition. For instance, the strong pig-pen odor which affected the Boston water supply several years ago, was traced to the presence of certain nostocs and allied forms.

Just how and why these plants affect any given water supply is not well understood. In some cases they appear for a short time, and then disappear permanently or nearly so. Our own water supply was, in the fall of 1876, affected for several weeks with an unmistakable fishy odor, described by Prof. Lattimore as due to "an obscure condition of the algæ." It appears to be fairly settled, however, that usually these abnormal smells and odors are accompanied by an increase in the amount of albumen present, either in the water, or in the vegetation growing in it, such increase, if in the water itself, being made evident on chemical analysis, by the finding of increased amounts of albuminoid ammonia.

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*Practical Biology, by T. H. Huxley, assisted by H. N. Martin, Chapter, The Fresh Water Polypes, page 104.

Prof. Nichols* has called attention to the fact that the water in which flax is retted, and the waste from starch factories, become very offensive, so that "it would indeed be difficult to persuade a person inexperienced in such matters, that the offense did not proceed from the decay of animal matter."

In both cases it appears a fair inference that large quantities of albuminous matter are present.

The application of the above becomes apparent when we consider that the algæ, chiefly concerned in the production of these various unpleasant odors, are such as produce at some stage of their development a considerable quantity of jelly-like (albuminous gelatine) protoplasm. Chief among such plants may be mentioned the Nostocs,† in which the most prominent habit of the plant is the trichomes (filaments) imbedded in a copious gelatine.‡ The Nostocs belong to the order Nematogenae, and other families of this order, as for instance, the Lyngbys exhibit the same or similar gelatinous development. Anabaena, Sphaerozyga, Cylindrospermum and Oscillaria, members of this order, have all been concerned in troubles of the kind now under consideration.

§In the order Cystiphorae we have another series of plants exhibiting the gelatinous structure, as for instance, Gleocapsa. Clathrocystis and Coelosphaerium.

The presence of any of these, and the allied forms, may be fairly taken as indicative of the existence in the water under examination of considerable quantities of decaying organic matter.

This view is confirmed by recent results obtained from studying the bacteria, and the development of more natural views of classification which have resulted from such study.

Dr. Ferdinand Cohn, struck by the affinities which the above and allied genera present with the bacteria, which, indeed, differ from these gelatinous algæ only by the absence of chlorophyl, has established a class of *Schitzophytes*, including all the Protophytes, which multiply by fission. This classification is based upon method of reproduction only, and is entirely independent of the question of absence or presence of chlorophyl.[*]

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*Some remarks on the Tastes and Odors of Surface Waters. Paper in the Transactions of the Boston Society of Civil Engineers, in the Journal of the Association of Civil Engineering Societies for January 1882, by Wm. Ripley Nichols, Member of the Society.

†Family Nostoceæ.

‡See Rabenhorst's *Flora Europea Algarum Aquae Dulcis et Submarine. Sectio* II. *Subfamilia* I, *Nostoceae.* "*Thallus gelatinosus*," etc. Also Cooke's British Fresh Water Algæ, Family Nostoceæ, page 224, etc.

§See Rabenhorst and Cooke, as above.

This is certainly a more natural basis for classification than that based upon presence or absence of color.

Sachs has farther shown that the old system of treating the algæ and fungi as distinct lines of development hardly fills the measure of modern knowledge of these subjects. It is also shown that some of the lower cryptogamia may develop through nearly a complete cycle of their existence without light, and that they may even develop chlorophyl without the presence of light.[†]

If this view of classification and development turns out to represent actual fact, we have strong proof of the truth of the statement above made, that the presence of the gelatinous algæ in any considerable quantity is a warning of danger of excess of organic contamination. Precisely such a warning indeed as Dr. Koch has shown us cannot be safely disregarded when we find the bacteria present in a public water supply in any considerable quantity.

In studying the biology of a water supply it is of importance to be able to cultivate at will the gelatinous algæ, and I regret that I cannot present to the Section at this time any method of successfully conducting such cultivations based on my own experience. I suggest, however, a trial of two culture fluids :

1. That of Dr. Maddox[‡] made according to the following formula :

Dextrine - - - - - -	2 grains.
Phosphate of soda and ammonia - -	2 grains.
Saturated solution of acetate of potash - .	12 drops.
Grape sugar - - - - -	16 grains.
Freshly distilled water - - - -	1 ounce.

The water is to be boiled in a large test tube or beaker for fifteen minutes, and covered while boiling and cooling, when settled it should be poured into perfectly clean, two drachm, stoppered bottles and kept for use.

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[*] A convenient reference in English for Cohn's new classification may be had to The Bacteria, by Geo. M. Sternberg, chapter II, Classification of the Bacteria, translated from the work of Dr. Antoine Magnin by Dr. Sternberg, second edition, page 66. William Wood & Co., New York, 1884.

[†] For Sach's classification of Thallophytes, see A Text Book of Botany, by Julius Sachs, second edition, page 244, also chapter on Action of Light on Vegetation. page 737 For development of chlorophyllaceous algæ without light, see *Entwickelungsgeschlichtliche Untersuchung uber Crenothrix Polyspora die Ursache der Berlin Wassercalamitat*, by W. Zoff. Published by Julius Springer, Berlin, 1879.

[‡] See paper on Cultivation of Microscopic Fungi, in *Monthly Microscopical Journal*, Vol. III (1870), page 14.

2. Cohn's culture fluid, which has the following formula :[*]

Potassium phosphate	1.00 part.
Magnesium sulphate	1.00 part.
Ammonium tartrate	2.00 parts
Calcium chloride	0.10 part.
Distilled water	200.00 parts.

This should be boiled until thoroughly sterile and a small quantity of the sample to be tested added and mixed.

For cultivating the gelatinous algæ, the rigid precautions for preventing contaminations necessary to be used in cultivating pathogenic bacteria will not be of so much importance. It will still be desirable to exercise care, as otherwise the fluids will be likely to be overrun by bacteria from the air, a result apt to be followed by the stifling of the alga it is desired to cultivate.[†]

A biological study of any sort at the present day would be seriously incomplete which did not devote considerable space to the bacteria.

This paper has already exceeded the limit of space originally set to it, and the bacteria are as yet untouched. I, therefore, respectfully suggest for the consideration of the Section, that the member to whom this subject is permanently assigned, present at the next, or at any early meeting of the Section, a paper on Methods of Studying the Bacteria. Special reference being had to such a course of investigation as the Section is proposing to undertake.

The end and aim of all biological study should be the preservation of the information gained, in permanent form for future reference. In order that such a record be of value, not only to the Section, but to others who travel the same way, the work should be illustrated. For this photo-micrography offers, I think, great facilities, and it is evident therefore, that all mounts should be made with reference to their value for photographic purposes. To this end it will be necessary that such staining reagents be used as will give the best photographic results. The technique of this field of work is in a somewhat chaotic condition, due to the fact that the recent recorded work has not been brought together in convenient form for reference. I therefore farther suggest for the consideration of the Section, that one of our expert photo-micrographers be detailed to present at an early meeting of the Section, a paper on the Application of Photo-Micrography to Biological Illustration, with special reference to the value of the various staining reagents for the production of actinic contrast.

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[*] From Carpenter's The Microscope and its Revelation, sixth edition, page 367.

[†] For hints on cultures see Botany by Chas. E. Bessey, second edition, pages 239-241 and 307

The list of papers and books on photo-micrography by Dr. A. Clifford Mercer, of Syracuse, as given in the fifth edition of Beale's How to Work with the Microscope, will furnish the basis of the course of reading necessary for the production of such a paper. The Memoirs of the late Dr. Woodward, by Dr. J. S. Billings, also contains a list of all papers relating to this subject by Dr. Woodward. So that in the way of finding literature there would remain to be hunted out only the floating papers of the last five years. Some of these, however, contain recent work of great value.

In conclusion, I have to ask the indulgence of the Section for the incomplete state in which this paper is presented. The short time allowed for its preparation must be my excuse, with a promise for the next time to do better.

A COURSE IN ANIMAL HISTOLOGY.

BY THOMAS G. LEE, M. D.,

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(CONTINUED.)

80. Staining and Mounting on Slide.—Celloidin sections may be fastened to the slide as fast as cut, similar to the paraffine method, by coating the slide with celloidin or collodion, (Summers.) A thin solution of celloidin or collodion is brushed over the slide and allowed to dry; the sections are placed on the coated slide, dehydrate with 95 per cent. alcohol; drain; pour on some of a mixture of equal parts or absolute alcohol and ether; allow this to completely evaporate; this fixes them to the slide; now place the slide in 80 per cent. alcohol; they are now stained, dehydrated and mounted in the usual manner.

If the sections are to be arranged in a series, the mass should be trimmed in such a shape that the sections can be arranged by means of it, and as fast as cut are placed in numbered dishes or on the slide.

81. Paraffine Methods.—The celloidin method, and the ones which will follow, are known as interstitial imbedding methods, and are superior to any of the others, except for some special purposes. The advantages are that all the natural cavities of a tissue are filled with the mass, thereby retaining the different parts in their exact normal relations, and also supporting the individual cells; at the same time it gives a uniform consistency to the whole mass, so that exceedingly thin sections may be cut, which are of sufficient strength to be handled.

Paraffine should be bluish white and ring slightly when struck; it should be kept in stock of different degrees of hardness, and to be mixed according to the temperature; paraffine of 36° and 56° C. are good grades; for a temperature of 20° C. (70° F.) mix two parts of the hard with one of the soft; the harder the paraffine the thinner the sections, but the greater the tendency to roll.

The objects are passed through successive alcohols to absolute, (96 per cent. to 98 per cent. will answer very well, if fresh), and then placed in clove oil, benzole, creasote, turpentine, or chloroform; after this they are brought into soft paraffine, then into pure paraffine.

Chloroform is one of the best of these solvents, and the object is placed from the alcohol into it, where it remains until saturated, though a long immersion does no harm; from this is goes into a solution of paraffine in chloroform, for several hours; finally into the bath of pure parafine, which is kept at a temperature not over 55° to 60° C. for from one to twenty-four hours, according to the size and consistency of the object.

In using turpentine use the same method as above, substituting turpentine for chloroform.

82. Imbedding.—The object is taken from the paraffine and imbedded in a paper box, or better are small pieces of type metal or brass; these may be L shaped; if so, two are used and the opening can be made of the required size by pushing together or separating them, or four straight pieces can be used in the same way. In either of the block methods the bottom is formed by a glass plate, and the whole moistened with glycerine to prevent the escape of paraffine.

The bottom of this box is filled with paraffine to the depth of 2 to 3 mm.; it quickly cools on the bottom, in it place the object as desired; fill the box with melted paraffine, and as soon as it chills enough to form a film place the glass and box in water, but not covering the top as there is a liability of the formation of holes; when cool, remove the metal blocks, and place the mass in cold water.

83.—The imbedded object is now placed in the microtome, the paraffine trimmed away from the sides of the specimen till it appears like a bluntly sharpened pencil; the knife is to be nicely sharpened ; and adjusted much less obliquely than for celloidin; the angle varies somewhat with the object, and after every thing is in good cutting condition a section smoother is placed on the knife; this is to prevent the curling up of the section. These may be smoothed out with a brush or needle held over the object while the cut is made, or a wire one made by bending a piece of small iron or copper wire at right angles twice; the two ends are now bent over the back of the knife so as to hold it firmly, the middle part of the wire being parallel with the cutting edge of the knife and placed so it very slightly projects beyond the edge and only very slightly separated, as the knife is drawn across, the thin section passes between the wire and knife edge and is smoothed out.—(Kingsley).

There are more elaborate and at the same time more accurate ones which can be imported from Germany. The only form which is made for sale in this country, to my knowledge, is that of the Bausch & Lomb Optical Co., Rochester, N. Y., which is inexpensive and answers the purpose very nicely.

The sections can be placed in benzole, turpentine, xylol, etc., to remove the paraffine, stained and mounted, but this is not as satisfactory as

84. **Mounting and Staining on the Slide.**—This method is the greatest importance as many tissues are friable, and the repeated handling would badly disarrange them, while in this manner the

thinnest section may be successfully carried through all the necessary processes without the loss or displacement of the smallest portion of the section, and it has been the means of perfecting serial work, where many hundred consecutive sections may be accurately arranged in order without the loss of a single one.

The principle is this, the slides are coated with a transparent cement which shall be insoluble in the solution used for dissolving out the paraffine and for cleaning. In some the section may be stained on the slide (86, 87, 88), in others the object must be stained before sectioning, otherwise the film will be stained.

85. **Carbolic Acid and Shellac Fixative**–(*Mayer.*)—Bleached shellac is pulverized and heated with crystals of carbolic acid till it dissolves, filter through a funnel, which is kept hot with a flame; apply with a brush at the time of using to a *cold* slide; apply only a thin coat, place the section, and then heat slide in oven of water bath of 50° C. for fifteen to twenty minutes; the acid evaporates and leaves a transparent film of shellac; free from paraffine, and mount. The staining must be in mass, previous to cutting.

86. **Gutta-percha Fixation**—(*Frenzal.*)—Dissolve gutta-percha in chloroform and benzine; allow solution to settle and filter till clean and almost colorless. The *solution must not be too thin*, but should flow only slowly on slides. The slides are prepared by brushing with the solution and allowed to dry.

The solutions are placed on the prepared surface and smoothed out, if needed, with a brush and absolute alcohol. Then heat, for a few minutes at temp. of 35° to 50° C., (never higher than 55°.) This makes the gutta-percha sticky and fixes the sections.

Allow slide to cool, then pour on naptha and pour off quickly; repeat and then drain thoroughly. The naptha is now removed with absolute alcohol, and then stain; or, if previously stained, can be mounted directly in balsam.

87. **Collodian Fixative.**—(*Schallibaum.*)

Collodian, - - - - - -	1 part.
Clove oil - - - - - -	3—4 parts.

Apply with brush at time of using, after placing section, warm five to ten minutes in oven to evaporate the clove oil ; or Gage's modification; coat the slides with collodian; allow to dry, and preserve from dust. When needed dust surface with a brush and paint the surface thinly with clove oil, and proceed as above; or again as in (**80**), coat with celloidin or collodian; let dry; arrange section and apply mixture of equal parts absolute alcohol and ether; let dry and proceed with the finishing processes; in any of these three ways the paraffine must be removed from the sections which are washed in alcohol, stained, dehydrated, cleared and mounted in the usual manner.

88. Albumen Fixative..—*Mayer.*—Mix equal parts of filtered white of egg and glycerine, add some carbolic acid as a germicide; at the time of using paint a thin layer on the slide; place sections; warm slide in oven (taking care not to coagulate the albumen); dissolve out the paraffine with turpentine; wash with alcohol; stain on slide; it permits of good aniline staining. After the sections are stained wash with 70 per cent alcohol, then place in 95 per cent. alcohol until the fixative has nearly lost all its color. This is a good guide for nuclear staining.

89. Celloidin Section Fixatives.—Dr. Minot arranges section on slide in 95 per cent alcohol; this is poured off and replaced by a drop of alcohol on each slide; place in oven five to ten minutes; clearifying in clove oil; mount in balsam. Staining must be done in mass.

Frenzel modifies (**86**) for celloidin, arrange on the gutta-percha film, wet with benzine or chloroform; dry and stain, etc. The celloidin may be removed with clove oil before mounting if desired. Allows good staining on slide. (See also **80**, **87**.)

90. Serial Sections.—Reference has been made to serial work. The object is to preserve in consecutive order sections of an entire object, as an embryo. In this way the whole object can be studied minutely in all its parts, and models can be made and built up from the observation made. The paraffine used in imbedding must be soft enough to allow the section to adhere to each other, or a block of hardened paraffine is coated on outside with soft, and this trimmed away on sides leaving front and back coated. The knife is fixed at right angle to the microtome, and quick strokes are made; the sections adhere and are pushed up on blade of knife, from which they can be removed in little chains; these are fixed to the slides by one of the above described methods.

91. Staining.—Nearly every preparation that is made is stained in some manner by which to demonstrate more clearly its minute structure. The reason that this is an aid is the fact that different parts of a tissue are acted upon in quite different ways by a stain, due largely to a chemical variation of structure. Thus, some stains are diffuse, as eosine; others are nuclear as carmine and hæmatoxylon; others again have a peculiar affinity for a certain tissue, as osmic acid for fat, silver nitrate for cement substances, and gold chloride for nervous tissue. Advantage of these facts are made use of in double staining, and for certain special purposes.

Stains are used in alcoholic or aqueous solutions; for the major part of work the alcoholic ones are preferable, as thus is avoided the passing of the section again into water with the subsequent dehydration, these repeated changes often very seriously damaging them. But there are some aqueous solutions which are very useful, as picro-carmine, alum-carmine, etc. Nuclear stains are to be preferred to diffuse ones for obvious reasons, and as alkalies dissolve nuclei, neutral or acid stains are generally used; fixing agents are sometimes mixed with the stains in working with fresh tissues, and where there is prolonged immersion required; tissues are often stained in mass, and in this case the alcoholic stains are to be used, as they do not swell or macerate the tissue, and are more penetrating.

Carmine and haematoxylon and their combinations are the standard stains, the most durable, and are fine nuclear stains.

The analine colors give brilliant results, but wash out easily and tend to fade if exposed to light; while light tends to darken preparations made with the mineral salts, as gold, silver, etc.

The difficulty of staining after certain fixing agents is the greatest trouble in working with them; for example, osmic and chromic acids, excellent fixing agents, prevent successful staining with carmine ; after fixing with chromic acid, hæmatoxylon, cochineal, safranin, magdala, dalia, are the best.

After osmic acid picro-carmine, alum-carmine or hæmatoxylon.

After nitric acid, corrosive sublimate, or alcohol, all stains work well.

After picric acid, if well washed out with *alcohol*, stains will work well.

92. Carmine.—This, which is probably the most used stain, is also the most valuable, taken with its combinations, and was the first used. Gerlach, in 1858, introduced its use. It will thus be seen that staining is not of such very long use in microscopic methods. Carmine is used in ammoniacal, neutral and acid solutions, both alcoholic, and aqueous : and in combination with other colors.

The ammoniacal solutions are objectionable for general use, for the reason given above, and because they are unstable compounds.

Carmine will give either a diffuse or nuclear stain. If the section is treated with weak H Cl., (.1 per cent.) the color may be entirely eliminated, except in the nuclei. If the specimen is mounted in glycerine a little formic or acetic acid is best added to it to fix the stain.

93. Ammonia Carmine.—(*Beale*).

Carmine	1 gm.
Ammonia	3 c.c.
Pure glycerine	96 c.c.
Distilled water	96 c.c.
Alcohol (95 per cent.)	24 c.c.

Dissolve the carmine in the ammonia, with heat; boil and let cool; leave uncorked until the excess of ammonia is evaporated; then add the other articles; after settling, decant; add a few drops of ammonia; pass sections, after staining, through solution of H Cl., (.1 per cent.,) in water, to differentiate

94. Neutral Carmine.—(*Heidenhain.*)—Prepare a carmine solution, same as (93) minus the alcohol; neutralize with acetic acid or by heating to drive off excess of ammonia; a few drops of this fluid is added to a dish of glycerine; this will not stain of itself, but if the dish is placed with another one containing acetic acid, under a bell jar, it gradually stains. This method is the best for demonstrating the peptic gland cells. Mount in glycerine.

95. Alum Carmine.—(*Grenacher.*)—One to 5 per cent. aqueous solution of ammonia alum is boiled ten to twenty minutes with 1-2 to 1 per cent. carmine; when cool, filter; add a little carbolic acid, and the solution will keep indefinitely; it stains rapidly; acts specially on nuclei: the solution acts on carbonate of lime, so objects containing it can not be used with this stain.

96. Alcoholic Borax Carmine.—(*Grenacher.*)—Dissolve 2 to 3 per cent. of carmine in a 4 per cent aqueous solution of borax; add equal volume 70 per cent. alcohol; good for staining in mass; bring from stain into alcohol acidulated with acetic acid, (four to six drops to 100 c. c.); wash out in alcohol.

97. **Aqueous Borax Carmine.**—(*Woodward.*)

Carmine, No. 40.	15 grains.
Borax	1 drachm.
Water	5½ ounces.
Alcohol, 95 per cent.	11 ounces.

Mix and filter; throw away filtrate; dissolve the crystalline residue on filter in eight ounces of water; evaporate to four ounces; tissues stain in a few seconds quite uniformly; pass into acid alcohol, (acetic acid 1, alcohol 4), till they are a bright red; wash in alcohol; a good nuclear stain.

98. **Picro-Carmine.**—This is a nuclear stain, but often has a diffuse action, however. It is a double or single stain, according as the tissue is passed from the stain into alcohol or water. Water removes the picric acid. The preparation should be mounted in balsam, or acid glycerine (formic or acetic acid.)

90. **Picro-Carmine.**—(*Ranvier.*)—To a saturated aqueous solution of picric acid, add a saturated solution of carmine in ammonia until a cloudy precipitate appears; evaporate to one-fifth the original volume, filter; evaporate the filtrate to dryness, giving a reddish powder, which for use dissolve in distilled water, a 1 per cent solution best. It should be neutral; if acid, add carbonate of ammonia till it gives a neutral reaction.

100. **Picro-Carmine.**—(*Gage.*)

Carmine,	2.5 gm.
Ammonia,	5 to 10 c.c.
Picric acid (saturated aq. sol.)	100 c.c.
Chloral hydrate,	5 gm.

Grind the carmine in water and place in a tall jar containing 300 to 400 c. c. water; allow to remain till the carmine forms a sediment over the bottom; pour off the liquid and add the ammonia; then the picric acid and enough water to make 500 c.c.; allow this to stand in a warm place (70 to 90° C.) till the liquid is nearly evaporated; then add water to make 500 c.c. of solution. Add 10 to 20 c.c. normal fluid (See examination fluids), and heat to 70 to 80° C. for a few hours. Filter through filter paper while the funnel neck contains absorbent cotton; lastly add the chloral hydrate.

101. **Picro-Carmine.**—(*Minot.*)—Boil 1 gm. carmine in 200 c.c. water, with an excess of picric acid, for half an hour; allow to stand and cool; decant the clear fluid and add fresh water and acid if

needed, and repeat the above operation till all the carmine is dissolved; add 1 gm. thymol to the decanted fluid, and evaporate to 25 c.c.; cool, filter, wash out residue on filter, with 25 c.c. water; dilute filtrate with 50 c.c. water.

This solution keeps indefinitely, is stronger than Ranvier's (99), but avoid over staining. Sections stain in two to five minutes. It stains fibrous connective tissue deep red; striped muscle, deep dull red; smooth muscle, blood and bony tissue, bright yellow; glands, reddish yellow. In kidney it differentiates the different portions of tubules. Little good for central nervous system. Will give a sharp nuclear stain.

102. Picro-Carmine and HCl.—(*Neumann.*)—Stain with picro carmine and wash out with a mixture of glycerine and 1-2 per cent. hydrochloric acid, or " one or two drops hydrochloric acid to a few c.c. glycerine"; this followed by pure glycerine. From one-half to several hours are required to remove the stain from the extra nuclear parts. Mount in glycerine. A nuclear stain; nucleus bright red, protoplasm, muscle, epidermal structure, citron yellow; intercellular connective tissue and fat unstained.

103. Cochineal.—A very useful reagent., as it gives an easily made and penetrating alcoholic stain, thus avoiding passing tissues into water; durable and posseses great selective power. Objects are best mounted in balsam. The stain is not as powerful as hæmatoxylon.

104. Alcohol Cochineal.—(*Mayer.*)—One gm. powdered cochineal is macerated in 8 to 10 c.c. 70 per cent. alcohol for several days, and shaken frequently; and filter the solution is ready to stain. Objects before being placed in it must be immersed in 70 per cent. alcohol, and transferred to alcohol of the same strength after staining, otherwise a precipitate is apt to be formed; if there is over staining wash out in 1-10 per cent. hyrochloric acid, or 1 per cent. acetic acid in alcohol. Acids make the solution of a light red, while ammonia changes it to a purple. It is a nuclear stain, acting only slightly on protoplasm. The color varies with the different reactions formed by the tissues from the absence or presence of certain salts; gland tissues often stain a grayish green; stains well after chromic or picric acid and alcohol. Osmic acid preparations should be bleached to stain well.

105. Alum Cochineal.—(*Czoker.*)—Seven gms. each of calcined alum and cochineal are rubbed up to a powder in a mortar; add 700 c.c. distilled water and boil to 400 c.c.; cool, filter and add a few crystals carbolic acid to preserve it. Stains nuclei hæmatoxylon color; other parts of tissue various shades of red. Specimens hardened in chromic acid require several hours to stain; for alcohol objects a few minutes are sufficient.

106. **Hæmatoxylon.**—This reagent is a most valuable one for a sharp well-defined nuclear stain if properly used, and keeping well if the specimens are free from acid. Stains well after hardening in chromic and the other acid fluids. The solutions, however, are not stable—liable to mould and form precipitates. New solutions must be made from time to time. Always filter before using.

107. **Alcoholic Hæmatoxylon.**—(*Kleinenberg.*)—(*a*). Make a saturated solution of crystalized chloride of lime in 70 per cent. alcohol. add a little alum, filter; add six to eight volumns of 70 per cent. alcohol to each volume of this fluid.

(*b*). Make a concentrated solution of crystallized hæmatoxylon in absolute alcohol. When using add a few drops of *b* to a dish of *a*, diluting if needed with more of *a*.

108. **Aqueous Hæmatoxylon.**—(*Mitchell.*)

Finely ground logwood, - - - -	℥ ij.
Sulph. alumina and potash (potash alum), -	℥ ix.
Glycerine, - - - - - -	fl. ℥ iv.
Water, a sufficient quantity.	

Moisten the ground logwood with sufficient cold water to slightly dampen it; place in a funnel or percolater; pack loosely and percolate sufficient water until it comes through slightly colored; allow the drug to drain thoroughly and remove from percolator, spread on paper and dry. Dissolve the alum in eight fluid ounces water; moisten the dry drug with sufficient of this fluid and pack rather tightly in percolator, and add the remainder of alum water; as soon as the fluid commences to come from the end of funnel close tightly with a cork and allow the drug to macerate for forty-eight hours. Remove the cork; allow the liquid to drain off; run through enough water to make twelve fluid ounces altogether. Mix this with glycerine. Filter; keep in closely stoppered bottle. A permanent solution may be used undiluted or in a weak solution (ten drops to two fluid drachms warm water for twelve hours.)

109. **Indigo Carmine.**—Indigo carmine, or the sulphindigotate of potash or soda, when pure, is soluable in water, slightly so in weak

alcohol, and particularly insoluble in absolute alcohol. It is a diffuse stain, but combined with oxalic acid is nuclear, (**110.**) Use chiefly in double staining with carmine.

110. Indigo Carmine and Oxalic Acid.—(*Thiersch.*)—Make a saturated solution of indigo carmine in a 1 to 22 or 1 to 30 per cent. solution of oxalic acid; dilute, if desired, with alcohol; used strong it stains in a few seconds. Over stains may be washed out with an alcoholic solution of oxalic acid.

111. Aniline Stains.—The coal tar colors are somewhat uncertain in action, largely due to the fact that it is difficult to get a reliable article. The chemical name is given in certain cases, to insure getting the right dye; but with a good quality of the dye, they stain very rapidly, and give a bright color, even after chromic acid hardening; yet they are liable to fade, and will wash out in alcohol unless great care is used.

There is a great variety of these colors, but the ones mentioned are among the most useful. They are used largely for double staining; are also useful in studying nuclei; and for this purpose the best results are obtained by the methods of Böttcher, Hermann and Flemming, (**112**).

The aniline colors do not give good results in staining objects in mass, as they stain unevenly, unless perhaps for very minute objects.

112. Nuclear Staining with Anilins.—Böttcher used Müller's fluid, followed by alcohol, for hardening; stained in aniline deeply; washed in alcohol; cleared in creasote; mounted in balsam. Hermann fixed with chromic acid; finished with alcohol; the rest as above.

Flemming considers Müller's fluid not a good fixative for nuclei, and that the stain is acted upon by the creasote. He fixes in chromic acid (.1 to .5 per cent. solution), the time the tissue is left in the acid not of much importance as far as the staining properties are affected; the fluid, however, renders the tissue brittle if left too long in it.

The tissue may be hardened with alcohol of increasing strength, after a short immersion in the acid, with good results; the acid must be thoroughly removed, however, from the sections before staining; the stains consist of solution of the aniline in absolute alcohol, this diluted almost one-half with water (dahlia, used in aqueous or acetic acid solutions without alcohcl). The sections remain in the stain twelve to twenty-four hours; are then washed in alcohol and brought into absolute alcohol until they appear translucent; then rapidly cleared with oil cloves, and mounted at once.

Specimens which have remained too long in alcohol do not take a good nuclear stain with the aniline. Strong solutions and prolonged staining are the points insisted upon by Flemming, as the following will show:

"Whenever it is desired to preserve in their true aspect the studies of nuclei, and the figures of nuclear divisions as they are preserved by means of chromic acid permanently, and to make such structures and figures susceptible of minute study by means of strong and accurate staining, in all such cases—this method deserves preference over all others. When no more is desired than a general nuclear stain, without regard to minute faithfulness of fixative, other methods are more convenient, as alcohol alum carmine."

Flemming obtained the best results from safraine, magdala and dahlia; these with the addition of iodine green, Bismarck brown, methyl green, fuchsin, methyl violet and aniline blue are among the most reliable and useful of the host of aniline dyes.

113. **Iodine Green.**—(*Hoffman's green.*)—Chemically this is the hydriodide of tetramethlylrosanilinmethyliodide. It is used by Griesbach as follows:

Crystallized iodine green - - -	0 1 gm.
Distilled water - - - - - -	35 c.c.

Place the objects in water for a short time before staining; they stain very rapidly; wash in water, and then mount in glycerine; or dehydrate with absolute alcohol, clear in clove oil and mount in balsam. The stain is not affected by prolonged immersion of several days in alcohol.

Alcoholic solutions may be used, but are no improvement on the aqueous ones; a nuclear and selective stain, staining different kinds of tissue in various shades of green; gland tissue, dark green, muscle diffusely, but nuclei show darker; sarcolema unstained. Bone and connective tissue do not stain well; in nerve tissue, skin and kidney acts well after chromic acid.

It is expensive, and for this reason not usually kept in stock. "It is the most useful of the anilines."

114. **Methyl Green.**—It is not as good as iodine green. Prepare solution same way, to which a few drop glacial acetic acid may be added; wash in water. Calberla found it to stain "nuclei of sub-

cutaneous connective tissue, and those of nerve sheaths and vessels, round cells of cornea reddish white, and epidermis greenish blue to pure blue."

115. **Safranin.**—Pfitzner uses one part safranin dissolved in 100 parts absolute alcohol, after a few days adding 200 parts distilled water.

A purely nuclear stain; works best with chromic acid preparations from which the acid has been removed as much as possible; stains quickly; sections keep well in a saturated solution of acetate of potash.

116. **Bismark Brown.**—(*Vesuvin.*)—Used by Mayer in saturated solution in 70 per cent. alcohol; may be used dissolved in acetic acid, or an aqueous solution in boiling water; a nuclear stain; acts quickly on alcohol and chromic acid specimens; does not over-stain or wash out readily; if glycerine is used for mounting, wash in water, if balsam, use alcohol and clove oil. It is a selective stain for plasma cells, and many forms of microbes; the brown color is also good for photographic purposes.

117. **Dahlia.**—*Monophenyl-rosanilin.*)—Dahlia is soluble in alcohol and water; the section takes in an aqueous solution—a blue-violet stain for the protoplasm, while the nuclei are pale; if they are now treated with very dilute acetic acid, the protoplasm becomes decolorized, and the nuclei assume a violet color. The solution may be prepared as follows:

Absolute alcohol - - - - -	50 c.c.
Distilled water - - - - -	100 c.c.
Glacial acetic acid - - - - -	12½ c.c.
Dahlia (to near saturation)	

Allow the stain to act for twelve hours.

118. **Eosin.**—Soluble in alcohol and water; gives a diffuse red stain in a very short time; is very penetrating; will wash out very largely, and the mounting media should be tinged with the dye; acids must be avoided in using the stain, as they precipitate it.

An aqueous solution, 1 part to 10, or 1 to 20 parts of water, and a few drops added to a dish of water; the section placed in this; wash out with water or alcohol.

The alcoholic solution is preferable, (Minot); dissolve 1 gm. in 100 c.c. of 95 alcohol, and dilute 1 part of this with 20 parts of alcohol; or, to an aqueous solution of eosin add HCl., and filter;

dissolve the residue, or filter in 10 to 30 parts of absolute alcohol; a few drops of this stock solution are added to a watchglass of alcohol for staining. This process prevents any precipitate on the specimen by means of acid contained in them from hardening; all of them are diffuse stains; eosin is used with picro-carmine for staining objects on account of the great penetrating power of the eosin. It is also used in double staining.

119. **Rose Bengale.**—Another of the eosin dyes, of a bluer color than the others; used for staining nerve tissues, and for multiple staining.

120. Chloride of gold, silver nitrate, palladium chloride and osmic acid are very useful for certain special purposes, as in the examination of nerves and their terminations, intercellular cement substances, lymph canals, fat, etc. The results are not always certain in using them, but successful preparations fully repay for the labor expended.

121. **Gold Chloride.**—This is one of the best reagents we have for studying nerve fibers, and for connective tissue corpuscles, as those of the cornea, etc., but the results are extremely variable. A .5 per cent. to 1 per cent. solution gold chloride in distilled water are the strength used. The simple chloride may be taken, but better are the double chlorides of gold and potassium or sodium, as they give a more uniform, neutral and stable solution; specimens may be followed by a nuclear stain, and are mounted in balsam or acidulated glycerine, (1 per cent. formic acid.)

Objects are liable to be over-stained or to darken on keeping. To prevent this Ranvier places the tissues in alcohol for a few days. If over-stained they may be bleached by washing in weak ferrocyanide of potassium, (Redding.) The tissues are put in the gold solution fresh, or after a previous immersion in an acidulated solution.

Fresh tissues are placed in 5 per cent gold solution thirty minutes in the dark, then exposed to the light in distilled water six to twenty-four hours, till they assume a violet brown color ; or the reduction may be hastened by taking from the gold, washing in water, and placing in a nearly saturated solution of tartaric acid which is kept at a heat of 40° to 50° C. until they are reduced; wash, then harden in alcohol and cut or examine in glycerine without previous hardening.

122. **Chloride of Gold.**—(*Ranvier.*)—The fresh tissue is soaked in filtered lemon juice (five to ten minutes for muscles); washed rapidly

in water, placed for twenty-four minutes in a 1 per cent. gold solution; again washed in distilled water, and placed in a mixture of one part formic acid to four parts water, and kept for twenty-four hours in the dark.

123. Chloride of Gold.—(*Viallanes.*)—Treat the tissue first with 1 per cent solution of osmic acid till it begins to turn brown; then with 1-4 per cent. formic acid solution for ten minutes; from this it is placed in a weak solution of gold 1-1000 for twenty-four hours in the dark, and reduced in the light in 1-4 per cent. formic acid.

124. Silver Nitrate.—This is used in the solid form or in solution, and may be used to inject vessels. It stains the interstitial cement substance, and maps out cells as in the endothelium of serous membranes and the lining of blood vessels, the lymph lacunae and canals, etc.

It can be made to give either negative or positive preparations; for the first the ordinary treatment is sufficient, this blackens the cement substance. For the positive, the object is exposed a longer time than usual in a strong solution, and at the same time it is carefully preserved from the light. Next place in a 2 to 5 per cent. salt solution for a few minutes and then place in distilled water in the light. This blackens cell spaces.—(His).

Silver processes are only applicable to fresh tissues and require sun light for the best results. When used in the solid form the stick of silver is rubbed over the surface of the object, as the cornea, this is now detached and placed in distilled water and penciled with a camel's hair brush to remove the epithelium, which is destroyed when touched with the silver; the silver is dissolved in the water and penetrates the deeper layes of the cornea, and is reduced by the light. It is more often used in solution; a 1 per cent stock solution is good, which can be diluted as required. Membranes, like mesenery, etc., should be carefully stretched on a bit of glass and wet with a half per cent. solution; when they assume a grayish color (ten to twenty minutes), remove; wash and expose to sunlight in distilled water.

The solutions vary in strength. Ranvier uses $\frac{1}{300}$ for epiploon, pulmonary endothelium, cartilage, tendon; $\frac{1}{500}$ for diaphragu intestine, etc.: for injecting solutions $\frac{1}{500}$ to $\frac{1}{800}$. Duval uses stronger solution, 1, 2 and even 3 per cent. To prevent over blackening the tissues, they may be placed immediately after taking from the silver solution, in a 2 to 10 per cent. solution of sodium hyposulphite, then washed in water.

125. Osmic Acid.—This acid has the property of blackening fat, and also stains medulated nerve fibers a bluish black color, is used in vapor or solution. The tissues do not take a stain readily after its use; alum carmine is one of the best; for over stains the tissue may be bleached by free chlorine. The objects placed in 70 to 90 per cent. alcohol; crystals of calcium chloride are dropped in and to this is added a few drops of hydrochloric acid; shake, and there is emitted chlorine gas which will bleach the specimen without any injury to it. If nitric acid is used instead of the hydrochloric, oxygen is formed, which is also good; the chlorine is good also for removing pigment, as in the eyes of insects; or the tissue may be placed in Merkel's solution (17). Osmic acid is of greater use in hardening and fixing. See (18).

126. Palladium Chloride. Hardens and stains: use small pieces tissue. Stains muscle, gland cells and epithelial tissue yellow; fat and connective tissue unstained.

Used also for nervous system; section placed in 1-6 to 1-3 per cent. solution for one to two minutes, then placed directly in a strong solution ammonia carmine. Axis cylinder stains red; medullary sheath yellow. See (32).

127. Multiple Staining.—The fact that the different stains act in various ways on the tissues has been taken advantage of in making double stains. In some forms the first stain is a nuclear one; the other stains the formed material. In others one stain acts on one kind of tissue wherever it may be found, while another color is taken by some other element; in this way tissues are mapped out accurately.

128. Borax Carmine and Picro-Carmine.—Add a little picro-carmine to a watch-glass of borax carmine having the alcohol of the same strength; stain slowly, diluting with acohol if necessary; wash out in acid alcohol (HCl.), nuclei red; protoplasm, orange; formed tissues, pale yellow.

129. Borax Carmine and Indigo Carmine.—Stain with carmine; wash in acid alcohol to get a good nuclear stain; wash out acid and stain for several hours in a weak solution indigo carmine—two to three drops of the aqueous solution to the ounce of alcohol; stains nuclei red; found material tinged with blue, connective tissue deep blue, bloodvessels purplish blood green, epithelia and hair various shades of green. A useful combination.

130. Carmine and Anilin Blue.—Stain with carmine; dehydrate, then stain from five to ten minutes in an alcoholic solution anilin blue, (10 drops saturated alcoholic solution to 10 c.c. absolute alcohol); most excellent for nerve centers as spinal cord, etc.

The sections should appear a violet color when taken from the blue stain,nerve cells and axis cylinder reddish violet, bloodvessels a sharp blue violet, connective tissue blue.

131. **Picro-Carmine and Indigo Green.**—Stain in picro-carmine; wash in acidulated water (acetic acid); then stain in iodine green; take care not to overstain; wash and dehydrate rapidly; mount in balsam; in section fœtal bone, new formed bone is red, calcified cartilage green.

Glands. Mucous glands green, serous glands red, adenoid tissue green, connective tissue red, muscularis mucosae light brown.

Cerebellum. Outside layer red, inner layer green.

132. **Picro-Carmine and Hæmatoxylon.**—Place in picro-carmine, then in hæmatoxylon; good for scalp, skin, tongue, and testicle.

133. **Methyl Green and Eosin.**—(*Calberla*).—Mix one part eosin with 60 parts methyl green, and dissolve in warm 30 per cent. alcohol; sections stain in five to ten minutes; wash quickly in alcohol; mount in balsam or glycerine; stains epithelia reddish violet or blue, connective tissue nuclei green or greenish blue, protoplasm red, striated muscles red, their nuclei green, smooth muscles green, their intercelluar substance red, cells of ducts of salivary glands blue, secretive cells red.

134. **Eosin and Analin.**—(*Schiefferdecker*).—Alcoholic eosin is made as in (**118**) and a 1 per cent. aqueous solution; is made of dahlia, methyl-violet and *anilin green.*

Stain for half an hour or longer, in a watchglass of alcohol, to which has been added a few drops of the eosin; wash in water and place in a watch glass of one of the aniline solutions for a few minutes; wash or pass through alcohol till excess of color is removed; then clove oil and balsam.

The preparations may be hardened in alcohol or in the eosin tincture itself, or chromic acid may be used; the anilin green stains green, the others blue, and are nuclear; while the eosin stains the protoplasm; stains cartilage matrix blue, and the capsule red, elastic fibre red, connective tissue rose red, bone and blood scarlet; useful for skin, bone, cartilage, central nervous system, glands of alimentary tract, liver, trachea and larnyx, lungs, genito-urinary tract, mammae, lymphatic glands; not good for muscle, kidney, peripheral nerve system, or sense organs.

135. Hæmatoxylon and Eosin.—(*Renaut.*)—May be used separately, but better in combination.

Make a mixture of equal parts of neutral glycerine and a saturated alcoholic solution of pure eosin, (**118**), add Bœhmer's hæmatoxylon, (*a*) pure hæmatoxylon, ℈j, in absolute alcohol ℥ ss, (*b*) calcined alum, gr ij, in water, ℥ j, add 2 to 3 drops of (*a*) to watchglass of (*b*), drop by drop till the green florescence has disappeared; filter; stain as with picro-carmine; mount in balsam or saline glycerine, (1 per cent.), if balsam, the alcohol and clove oil must be charged with eosin; osmic and chromic acid preparations stain selectively: connective tissue grey, nuclei violet, elastic fibre and blood deep red, protoplasm and axis cylinder light red; good for gastric glands, the two varieties of cells taking different colors, also salivary glands, the mucous cells blue, the other cells red.

136.—The above examples of multiple staining will serve to illustrate the principle and the methods of their use; various other modifications will readily suggest themselves. The sections having been stained are washed thoroughly to remove excess of stain and to differentiate the tissues in some cases ; for this purpose, after aqueous stains we use distilled water, and dilute alcohol for those coming from an alcoholic stain ; after washing, the sections are placed in fresh 95 per cent. alcohol to dehydrate, delicate objects being treated first with 70 per cent. to prevent shrinkage, and if the specimens are thick or haste is essential, they may be finished in 98 per cent. or absolute alcohol; it is necessary that *all* the water be removed—otherwise there will be a cloudy appearance produced in the finished specimen; after being dehydrated they are cleared.

137. Clearing Agents.—The object of a clearing agent is to render a tissue transparent and to expel the alcohol used in dehydration; it must also be a solvent of the mounting medium. The essential oils, creasote and carbolic acid possess these properties to a greater or less extent, and of these oil of cloves, turpentine, creasote, and carbolic acid are among the best.

138. Clove Oil.—This oil has a high refractive index and readily mixes with balsam and alcohol, a drop of it on a dehydrated section very rapidly rendering it transparent, but like most of the clearing agents it is apt to shrink delicate objects and to render specimens brittle if left in it for any length of time ; use only a clear oil, the dark colored oil will not act as readily.

139. Carbolic Acid.—The crystals dissolved in alcohol clear sections rapidly, but better is a mixture of the melted crystals two parts and turpentine three parts. Thick turpentine is used sometimes, and creasote may be employed. The sections are now ready for mounting.

140.—Mounting and Preservative Fluids may be divided conveniently into the resinous, the glycerine and the aqueous classes. Their index of refraction decreases in the above mentioned order.

The process of dehydrating with alcohol and clearing refers only to those specimens which are to be mounted in a resinous medium.

141. Canada Balsam.—This is undoubtedly the best of all mounting media. It may be used as it comes in small tubes, but these specimens dry slowly, and it is generally prepared by dissolving the baked gum or the contents of a tube in xylol, chloroform or benzole; these dry quickly and are easy to use. A drop is placed on the section and the cover placed on it, taking care not to include air bubbles.

142. Dammar.—The gum is dissolved with heat in equal parts benzole and turpentine. This makes a very nice mounting fluid, but it is unreliable in that it is apt to cause a cloudy precipitate in the specimen after a time ; Canada balsam is much to be preferred.

143. Glycerine.—This is used by itself and also as a component element of a number of fluids. Sections after staining are thoroughly washed with water, then brought into dilute glycerine, from time to time more glycerine is added till the water in the specimen is replaced by glycerine, in which manner very delicate objects can be mounted without distortion or shrinkage. Owing to the hygroscopic properties of this fluid the dish containing the specimen must be kept tightly closed, also the cover of the mounted object must be sealed to exclude the air. This is not always easy to do, but a ring of glycerine jelly or gelatine, followed by some other cement, will usually be successful. (See **147**.) Carbonate of lime is dissolved by glycerine, so avoid mounting objects containing it in this fluid; for carmine stained sections it is better to acidulate glycerine with one per cent formic or acetic acid. Glycerine is also useful for preserving tissues stained with gold, silver or osmic acid, till required for use. When the specimen will not be injured by heat it is more convenient to use glycerine jelly.

144. Glycerine Jelly.—20 gm. pure gelatine are soaked two hours in 120 c.c. distilled water, 140 c.c. glycerine are added and the mass heated till completely dissolved, then add 1 c.c. strong carbolic acid for each 100 c.c. of the mixture, and filter while hot through spun glass.

To use, melt on a slide a small bit of the jelly and arrange in it the object, which has been soaked in glycerine, and cover quickly, it hardens on cooling and is permanent, and allows of being more readily finished up than glycerine mounts.

145. **Farrants Medium**:—

Gum Arabic - - - - -	1 ounce
Glycerine - - - - - - -	1 ounce
Water - - - - - - -	1 ounce
Arsenious Acid - - - - -	1½ grains

Dissolve the arsenic in the water, then the gum, lastly add the glycerine—often used instead of glycerine alone—finish as for glycerine.

146. **Acetate of Potash**.—A nearly saturated solution of potassium acetate in water is useful for bone sections and preparations requiring a mounting medium of low index of refraction.

There are a great many mounting media under each of these classes, but the above mentioned are sufficient with which to commence work.

147. **Finishing.**—Many forms of cements and varnishes are employed in securing the covers to the slide. These can be prepared from formulæ, but it is better to purchase them from dealers. Balsam preparations do not need any cement to increase their durability. Fluid mounts are best coated with a ring of warm glycerine jelly then finished with some strong cement, as shellac, marine glue, white zinc, asphalt, etc. It is often better to make a ring of shellac on the slide previous to mounting in glycerine or other fluids. A turn table is necessary for doing good work in ringing slides or making cells. Each slide should have a label on which is noted the tissue, the method used in preparing it, and the date.

148. In the preceding pages are given a variety of methods and formulæ which will seem confusing to the inexperienced person. It is not expected that each person will make use of all of them, but they will serve to guide the advanced student in undertaking original work, while for the beginner we give an outline of the course that is best to pursue. For material select some of the lower animals, a rabbit or guinea pig, a cat and a frog, furnishing an abundance of material if well prepared, for the study of all the tissues and organs. Prepare a 1 per cent solution of osmic acid (8) and the chromic acid (9,24) also some Müllers fluid (29). The animal is chloroformed

and then bled thoroughly by opening the heart or the large arteries of the neck. Now remove the viscera and put small pieces of the heart and large blood vessels, lung, trachae, œsophagus, stomach, intestines, liver, spleen, testicle, penis, ovary and uterus in a one-half solution of chromic acid—the pieces must be small to allow of their being penetrated by the acid; after six or eight hours take them out and wash in running water for several hours, then place in sixty per cent alcohol, changing twice in twenty-four hours, then place in eighty per cent alcohol for two or three days, finally in ninety-five per cent alcohol.

A portion of one of the long bones is washed and placed in chrom-nitric acid (**37**), to decalcify; remove the brain and spinal cord, cut them in several pieces, place in Müllers fluid, in which also place the eyes, sciatic nerve, skin, and foot pad of cat. The salivary glands and pancreas place in 98 per cent alcohol. The Müllers fluid must be changed two or three times in two weeks, and then place the pieces in ninety-five per cent alcohol. Label all the jars containing these specimens with their contents and date; use at least ten times the bulk of fluid to one of tissue.

More explicit details will be given as to the preparation of the various tissues, with the description of their structure. Use at first a simple embedding mass as (**76**) or a freezing microtome, when more experienced use celloidin (**79**), this and the paraffin methods giving the best results, but are more difficult to carry out successfully in the hands of a beginner. Stain with hæmatoxylon (**107**, **108**) or carmine, as alum carmine, (**95**)and after becoming familiar with these others may be used.

149.—The following is a list of some of the books and journals treating more or less wholly of methods, and the use of the microscope:

1. Bausch, Edw.—Manipulation of the Microscope.
2. Beale, L. S.—How to Work with the Microscope.
3. Burden Sanderson.—Hand Book for the Physiological Laboratory.
4. Carpenter, W. B.—The Microscope and its Revelations.
5. Fol, H.—Lehrbuch der vergleichenden Mikroskopische Anatomie.
6. Frey, H.—The Microscope and Microscopical Technology.
7. Gage, S. H.—Notes on Histological Methods.
8. Gibbes, H.—Practical Histology and Pathology.
9. Lee, A. B.—The Microtomists Vade-Mecum.
10. Rutherford, W.—Outlines of Practical Histology.
11. Whitman, C. O.—Methods of Research in Microscopical Anatomy and Embryology.

12. The American Monthly Microscopical Journal.
13. American Naturalist.
14. Archiv fiir mikroskopische Anatomie.
15. Journal Royal Microscopical Society.
16. Microscope.
17. Zeitschrift für wissenschaftliche Mikroskopie.

This is but a partial list, as most of the works referred to in Part II. contain more or less on the preparation of tissue. We are much indebted to the above mentioned works for many of the methods just described.

PART II.

STRUCTURE.

150.—Histology or microscopic anatomy treats of the minute structure of the tissues of an organism.

The structural basis of all living organisms, animal or vegetable, is a soft, complex, albuminous substance, which is known as Protoplasm. The lowest forms of animal life are merely small particles of structureless protoplasm, and are called cells. A cell is the morphological unit of the tissue of all animals. By examining one of these animals we study the properties and functions of protoplasm and thus those of a cell. A small unicellular organism called the Amœba is usually taken for this purpose on account of its size and the readiness with which it can be procured.

151.—Collect some of the ooze, or thin layer of slime, covering the mud at the bottom of stagnant water, or the soft mass found on the stems and under surface of the leaves of water plants, place in a flat open dish, expose to the light for a day; a little of the thin scum which is found on the surface of the water is put on a slide and covered.

152.—In successful preparations you will presently see small transparent masses which are slowly moving about. Examining one of these amœbæ with a high power we notice it has the power of spontaneously projecting finger-like processes of protoplasm (*pseudopods*) from any portion of the mass. These may increase in size by there flowing into them the soft streaming mass, till finally we see the amœba has quite changed its position; this constitutes the so-called amoeboid movement (see Blood). Protoplasm also possesses the vital properties of contractitity, nutrition, growth and reproduction, all of which are exhibited by this little animal.

153.—As we ascend the scale of animal life we find that the organisms consist of an increasing number of cells, and at the same time the various functions which were carried on by the protoplasm of the single cell, as in the amœba, are now distributed among the various cells of the multicellular organism.

This differentiation of function increases the higher we ascend, so that among the vertebrates the vital functions are carried on by complex structures called organs, these consisting of various tissues and these tissues again composed of cells.

154. Cells.—All multicellular animals are derived from a single cell—the ovum—by repeated division of the cells. A cell consists of a small mass of protoplasm—in young cells, soft and allowing amœboid movements, in older ones the outside may become more dense and unyielding. Within this cell body is contained a small, usually round, doubly contoured vesicle, which is called the nucleus; the nucleus contains one or more minute particles termed nucleoli. Most authorities agree that the minute structure of a cell consists of a delicate net work or reticulum of protoplasmic threads pervading the body of the cell and enclosing in its meshes softer protoplasm. This constitutes the intra-cellular network. The nucleus contains a similar reticulum forming the intra-nuclear network. These two networks are continuous with each other, and within the nucleus are found one or more small round bodies called nucleoli. These are considered by some writers to be formed by the crossing of the of fibrils the intra-nuclear reticulum. The protoplasm often contains small globules of fluid which are termed vacuoles.

Cells vary greatly as to size, shape and structure in different parts of the body according to the various tissues they compose, being columnar, cubical, flat, spindle shaped or irregular in form, and in most tissues many of the cell are so modified that they receive the name of fibers: cells vary also in size from that of a white blood corpuscle of 1-2500 inch diameter, with a nucleus 1-5000 to 1-10000 inch, to that of a multipolar nerve cell 1-200 inch diameter, nucleus 1-800 to 1-1200 inch. Cells also differ greatly as to chemical composition and function.

155. Intercellular Cement Substance.—This is a transparent and homogeneous material, which is found between the cells and fibers of a tissue, in some instances being quite considerable in amount forming what is known as the matrix or ground substance, and having imbedded in it the cells; in other places the cement forms only a very thin layer between adjoining cells. This substance possesses the power of being stained with nitrate of silver and in this way it can be rendered visible under the microscope.

156. Multiplication of Cells.—Cells increase in number by division, a cell dividing into two others. The process by which this division takes places in most cells, is known as Karyokinesis, or indirect cell division. The nuclear wall disappears and the intranuclear fibrils go through a complicated series of charges, finally separating into two new nuclei, with this there is contraction and division of the protoplasm, so that at last there are formed two cells identical with the first one. This process will be discussed later in detail. (See Epithelium). In some cells, however, we have a repeated division of nuclei previous to the division of the protoplasm, this as seen for example in cells of bone marrow; and is called endogenous cell multiplication. Some cells probably multiply by direct division, a constriction taking place in the middle of the cell and resulting in a cleavage of the nucleus and protoplasm.

157. Development of Cells.—All the cells of the body are derived by repeated division from a single cell, the ovum. This, which may be regarded as a typical cell, is a minute globular mass of protoplasm of about 1-120 of an inch in diameter in mammals.

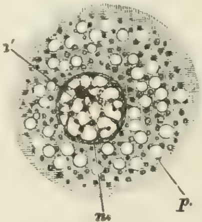

Fig. 1. Diagram of a cell. *p.* Protoplasm containing granules and vacuoles ; *n.* nucleus ; *n'.* nucleolus.

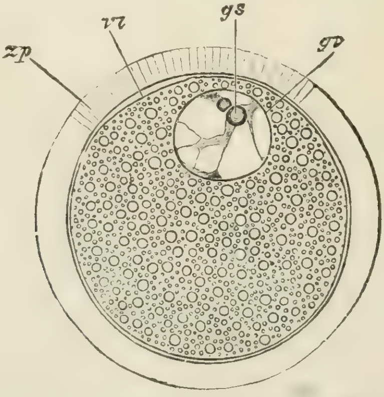

Fig. 2. Diagram of Ovum. *zp.* Zona pellucida ; *vi.* vitellus ; *gv.* germinal vesicle ; *gs.* germinal spot.

When examined closely the ovum is found to consist of a granular yolk mass, which contains a small mass with a distinct membrane, known as the germinal vesicle, corresponding to the cell nucleus. In the germinal vesicle are found one or more globules, which are the germinal spots, these correspond to the nucleoli of the cell. Surrounding the yolk mass or vitelus which corresponds to the cell protoplasm, is a striated membrane, the zona pellucida. (See Fig. 4). After the impregnation of the ovum, there commence a series of complicated changes, which result in the cleavage or division of the ovum into two spheres, one being somewhat larger than the other. These spheres continue to segment or divide, and the cells from the larger sphere finally arrange themselves as a layer, enclosing the cells resulting from the division of the smaller sphere. This double layer of cells is known as the germinal layer, or Blastoderm.

158. Blastoderm.—The outer layer of cells in the blastoderm is called the epiblast, the inner one the hypoblast. From these latter there is developed a middle layer, the mesoblast, and it is from these three layers that all the tissues and organs are derived. The epiblast giving rise to the entire nervous system, and the epidermis. From the mesoblast is derived the circulatory system, muscle, the connective tissues, generative organs and kidneys, and from the hypoblast the epithelium of the alimentary canal and its glands, the respiratory tract and bladder.

159. The Tissues.—As development proceeds, the original embryonic cells become greatly modified in structure, shape, and composition chemically, and masses of similar cells constitute a tissue. The cells of one form of tissue often show a transition between that and a similar form. The various organs of the body are composed of one or a mixture of several tissues. The following table will show the various tissues and their origin.

1. Epithelial	Epiblast. Hypoblast.
2. Blood and Lymph*	Mesoblast.
3. Connective	
4. Muscular	
5. Nervous	Epiblast.

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*Blood and Lymph are classed as tissues for convenience of classification.

"THE AMERICAN SYSTEM OF DENTISTRY"—DENTAL MECHANICS.

BY A LOOKERON.

"The rapid development of reserves in dentistry, no doubt, is to be attributed to the increase of its literature, and the free discussion and dissemination of thought in reference to those things which commonly engage the attention and best efforts of its practitioners. The effect has been to enlarge and perfect the means for overcoming the difficulties with which it contends, and to lessen the labor by which its best achievements are attained. The tendency has been in strict conformity to the spirit of the age in which we live, and that we well know is to lessen the sum of human labor, as well as to enlarge its boundaries."

These words are truer to-day than when written and uttered more than ten years ago. Journals have increased in number, and faithfully reflect the progress made in the evolution of the sciences from corresponding act in every branch of dentistry, as shown in the reports of the doings of societies and special contributions to their pages.

If, as yet, we fail to mark a tendency to actual consolidation, societies have occasionally combined for united and concentrated effort in special and common lines of inquiry. Discussions have gained in breadth, point, and definiteness ; observation is wider and closer ; analysis more acute ; synthetical conclusions quicker and more just—demonstrating again and again that "knowledge is two-fold, consisting not only in the affirmation of what is true, but the negation of that which is false." Hence a closer approximation to scientific methods of investigation, and a clearer apprehension of the great fact, at once so comprehensively and tersely stated by a distinguished philosopher: "To command nature we must obey her," and better directed work to find her out.

Much good and some thorough work has been done and is doing in one or the other of two ways—sometimes in both—so aptly described by Mr. Wilson, of Rugby, Eng., on "Teaching Natural Science." He says, "There are two different methods of teaching science : one the method of investigation, the other the method of authority. The first starts with the concrete and works up to the abstract ; starts with facts, and ends with laws ; begins with the known and ends with the unknown, and applies it to the known. The second starts with what we call the principles of science, announces the laws and includes the facts under them; declares the unknown and applies to the known." Of "the two the latter is the easier, the former is by far the best. First, because knowledge must precede science, which is only systematized experience and knowledge. A certain broad array of facts must preexist and be known, before scientific methods can be applied. Second, whatever new facts you give the learner, they must not be purely foreign facts, but must fit on to his already existing stock. It is to this existing knowledge, and to that alone, you must dig down to get a sure foundation, and the facts of your science must reach continually down, and rest securely thereon. Otherwise your building will be a castle in the air."

But our author raises a warning voice, by showing how easily scientific teaching passes from things to words. He says, "If strange terms and formulæ are presented to the learner before he has realized the ideas and laws which they express, he is at once landed in "cram." No scientific name should ever be given for a fact or idea before there is real need for it; that is, before the fact or idea is clearly grasped, and the want of a name to fix it is really felt. Then, and not till then, the name may be safely given. No principle of classification should be announced before we have climbed by steps of reasoning up to it."

How much there may be in dental nomenclature that is accepted, but not warranted "by steps of reasoning up to it," is no part of the purpose of this writing to show.

At least metaphorically hybrid, composite compromit of many extranenous arts and sciences, dentistry to-day presents leading characteristic features that are certainly *mechanical.* Thence and from all sources to draw upon, and from the art implied in turning what it gathers to use, dentistry has rapidly and surely been evolving its own definite science, which must therefore be not so much one separate and distinct science, as compromit of various sciences and arts.

If we trace the existing dependencies of one science upon another, we also find some that have inter-dependencies whose reciprocal services, if often unequal and sometimes far from balanced, are, nevertheless, pretty certain to mark with precision the equal development of each one within its own sphere, be that large or small.

And as between medicine and dentistry, we see that these natural correlations are doubtless much impeded by the slowness of the average medical practitioner to recognize the equal service dentistry is able to return for the service given it by medicine. Too often the medical man is ignorant of this, and worse—apparently willing to remain ignorant of his ignorance.

This, however, cannot be the real temper of medicine towards dentistry, and if it were, the production of such a work as gives title to this writing must certainly soon change it for a better.

Fertile in resource, and pregnant with invention and expedient in all those more obvious demands on art and science, dentistry is enlarging its base, taking in and appropriating all that is necessary to full equipment, (if in a more limited sphere,) of what is essential and fundamental to medicine and all its recognized specialties. It may already challenge comparison in its own clinical practice the art required in clinical medicine and surgery. And of clinical medicine Dr. Acland said, in his address, on taking the presdent's chair of the British Association at Oxford, in 1868: * * * * "Science being organized knowledge, and admitting no uncertain element, objects to the probabilities which guide the master of the art to his conclusions, and lead him to act with a promptitude incomprehensible and appalling to the uninitiated, just as the scientific navigator, who is furnished (as every navigator ought to be) with the instincts of the empirical seaman, trusts those instincts in a gale, as readily as his accurate observations in clear weather. So the true clinical physician decides first, and afterwards puts together in logical arrangement' the reasons for his decision. In so far as he does this, he abandons the order of pure science. Still he must do so in many cases if he is to act at all. If he cannot do so, he is apt to become sceptical, then indifferent." And pursuing the subject, the distinguished Dr. Gull also said, on the same occasion: "Clinical medicine, though a special department of knowledge, is so intimately connected with other sciences, that, when the claims of these are satisfied, it might seem nothing would remain to it. This appears to me the present error of our schools. It would not be, however, too much to assert, that were it possible to conjoin in one human intelligence all that is now known of other sciences, such knowledge would be compatible with entire ignorance of clinical medicine. As the physiologist must yet assert that the phenomena of living tissues are not explained by their chemical composition, or, as the chemist has equally to admit, that mere isomerism may be no clue to chemical qualities, so the clinical physician knows that the phenomena of disease are not explained by the knowledge of healthy textures, nor by the action of healthy organs. Clinical work is a work by itself; and yet if I may use the comparison, only so far by itself as one form of organic life may be considered separate from another. It stands apart, but has most intimate relations to all that surrounds it. It is elucidated by the light of physics, chemistry, and physiology, yet is not comprehended by them as they now stand.

"In ages gone by, Hippocrates had to vindicate the study of disease from the inroads of superstition. At the present day we have to guard it against assaults on the side of science, and need to watch lest we betray it by accepting a too chemical or physical limit to our thoughts.

"We should all contemplate with great satisfaction such inroads of the collateral sciences upon medicine, as that at length medicine might have no separate existence; but this consummation appears to be, as yet, far distant, and must be so acknowledged. Happily such is the extension of the human mind into Nature that almost daily new regions are discovered; and the boundaries of the old are so extended as to require fresh subdivisions in order to bring them within the domain of thought. Formerly the physician might have been able to comprehend all that then constituted the allied sciences of medicine; but that can never again be possible. His duty lies, therefore, in giving an exact and scientific character to the department which remains to him,—to investigate its phenomena with that concentration which is necessary in every physical inquiry, and with all those aids which are afforded in increasing perfection by modern science."

As there can be no question about the narrowing tendency of too exclusive devotion to one class of pursuits, both of these eminent English physicians indirectly emphasized the importance of wide culture, and the pursuit of knowledge, pure or applied, which it is possible for one mind to take in of all that relates to its life-work. Without this full mental equipment, the highest achievements are now well nigh impossible in any scientific pursuit. Every science has some concrete entity, some congeries of facts, which is called in a general way its subject-matter; but that can never be perfectly mastered until its relations to allied sciences are understood, accurately described, and their possible limitations defined, as then existing.

From the complex nature of dentistry there may yet seem supreme difficulties in the way of precisely determining its relative place, particularly with reference to medicine. If this is an unknown quantity yet to be measured, described, and defined, let it be found out by scientific methods—not by hazarding precipitate, hypothetical experiment—in the sure path from the known to the unknown, starting from the concrete to work thence backwards toward the hidden principles which these facts embody. Then, even should that not justify a closer alliance of dentistry with medicine, the final result will be to vindicate a stronger claim to such alliance, or destroy it altogether. But in either event dentistry will stand higher, and compel that cordial as well as respectful consideration which, perhaps, is now only begrudged or reluctantly given it by too many of the medical profession.—We must remember that "the greatest friend of Truth is Time; her greatest enemy Prejudice; and her constant companion Humility;" and that "Ignorance is the mother of Prejudice."

"It has been asked, which are the greatest minds, and to which do we owe the greatest reverence: to those who, by the powerful deductions of reason, and the well known suggestions of analogy, have made profound discoveries in science, as it were '*a prioci?*' or to those who, by the patient road of experiment, and the subsequent improvement of instruments, have wrought these discoveries to perfection, as it were '*a posteriori*;' who have rendered that certain, which before was only conjectural, practical, which was problematical, safe, which was dangerous, and subservient, which was unmanageable? It would seem that the first class demand our admiration, and the second, our gratitude." But may it not be quite possible that such positive gains in dentistry are subject to contingent losses, and that in this age of methods and details made comparatively facile, the ultimate effect on the profession at large may be debilitating? Probably not, for the field of investigation, discovery, and invention still widens in every direction.

If there are any converging lines of sense in this desultory writing and use of quotations, they were meant to meet in two thoughts and to expand them, but at length they shall be stated very briefly: First, to quote one of the celebrated Cardinal De Ritz's political aphorisms, that "There are times and occasions so extremely unfortunate, that whatever is done must be wrong,"—doubtless from whence came Daniel Webster's "Masterly Inactivity;"—with due deference also to the maxim by Aristotle—

his first—namely, "Life is short, and the art is long; the occasion fleeting; experience fallacious, and judgment difficult. The physician must not only be prepared to do what is right himself, but also to make the patient, the attendants, and externals coöperate;" and then invite attention to whatever may be applicable to the situation and condition of dentistry. And, second, to urge the giving due consideration to the great importance of "The American System of Dentistry" as a conservative power, at this juncture, quite independently of any or all criticisms which may be passing upon it. If many can appreciate the high ideal which lay at the foundation of the work, few will properly estimate the patient daily toil, year in and year out, by the body of earnest, honest, and unflagging workers engaged in collating its vast amount of matter, and how thoroughly the work has been wrought up to that ideal; and fewer still the great strain put upon the editor—if somewhat divided among others who helped him in dilemmas, encouraged him in difficulties, or assisted him in surmounting such fortuitous obstacles arising in the progress of the work, as no human foresight could provide for. All such considerations, and many others, will occur to some, and have due weight in balancing their judgments of the undoubted great worth of this complete "American System of Dentistry."

That the temper of modern science largely affects and may indirectly rule the progress of the Healing Art, presents a serious question in these times, as it did in the time of Newton, who thus aptly described it: "The main business of Natural Philosophy is to argue from phenomena without feigning hypotheses, and to deduce causes from effects, till we come to the very First Cause, which certainly is not mechanical."

WHAT?

What is pus? "An albuminous, non-coagulable fluid containing multitudes of leucocytes." What is suppuration? "The splitting of living nitrogenous tissue into simpler compounds through the influence of certain bacteria." In this way the parallelism of the three processes—fermentation, putrefaction, and suppuration—is established.—*Archives of Dentistry.*

ALVEOLAR ABSCESS.

Whatever the cause, alveolar abscess is a suppurative inflammation of the periosteum, frequently resulting in the formation of a sac filled with pus at the apex of the root. In the early stages, the symptoms are simply those of periodontitis deep seated, but no great pain or tenderness on pressure, with frequently elongation, owing to the conical shape of the fang, the pressure resulting from the inflammation forcing the .tooth out of its socket. If a patient were to come to you with the symptoms I have indicated, what would be your treatment? Manifestly, it would be your duty to do what you could to relieve the inflammation ; but to do this intelligently, you must be sure of your diagnosis. First ascertain which is the suspected tooth. This is not usually difficult, as the tenderness will be a prominent symptom ; then drill into the pulp cavity. Do this in that part of the crown which will render the subsequent treatment easy, by having direct access to the canal. If, when drilling, tenderness should manifest itself—for alveolar abscess is not always associated with a dead pulp—it may be desirable to suspend operations and have recourse to medicaments applied to the gum, near the end of the fang. I have not found any external treatment as valuable as the application of the dental tincture of iodine. This is made by adding an excess of the crystals of iodine to the B.P. tincture. After several months the alcohol takes up a much larger proportion of the iodine. Associated with this, or in lieu of it, a stimulant may be applied; and lately we have had furnished to us from the depots a small felt plaster containing capsicum. This is applied one or more times for several hours each, and will generally be found to give a good deal of relief. But generally sensitiveness is not met with, and the drill enters the pulp cavity. Frequently at this point pus or blood will make its escape, and the patient will express a feeling of relief ; but this is not always the case. The pulp cavity is at times found to be quite empty; it is then your duty to try and reach the seat of the trouble by means of a long fine probe through the tooth. Sometimes the sac can readily be punctured in this way ; but generally you must be satisfied with reaching the apical foramen. If no discharge takes place on removing the probe, it will then be desirable to drill out the canal through the apical foramen into the sac beyond.

Where the pulp is dead, whether you wish to treat a case of alveolar abscess or not, take the first opportunity to cone out the canals, open fully into the bulbous portion, and from that open into the canals, first using as large a bur as the cavity will allow, and then follow this with a small size; then use the large nerve canal drills and ream out, say half the length of the canal. You can readily see the object of this cone-shaped orifice; it is to facilitate the introduction of the medicine and the subsequent stopping of the root. When the orifice is fairly accessible, the best way to remove the *debris* from the canal is with a Swiss five-sided broach, the two smallest sizes made; this should have the point broken off, for a square point will, and a sharp point will not, allow you to push up the bit of cotton wool, or, what I consider far preferable, Japanese paper; the temper of the broach should be drawn by passing it quickly through the flame of a lamp, a blue color being what is most desired—in other words, a spring temper. The soft and extra soft nerve broaches of the depots I can find no use for. Wrap a minute bit of Japanese paper near the end of the broach and pass it into the canal, unwind and push it well in, then twist it on the broach again, withdraw and repeat. Sometimes it will take a dozen bits before all trace of discoloration disappears. This is equally necessary either for alveolar abscess or where it is desirable to prepare the canals for stopping.

For alveolar abscess, first fill the syringe with warm water, and after placing the point far up in the canal, wash it out by alternately compressing and releasing the rubber bulb; then draw all the water out and repeat with the peroxide of hydrogen. If bubbles appear, of course pus is present. Then introduce a solution of pure carbolic acid by means of the same syringe, filling the cavity near full; take a piece of softened red gutta percha, in bulk a little larger than the cavity, and by the use of a large flat-pointed instrument, nearly as large in diameter as the orifice, with considerable pressure force the carbolic acid, and if a fistula is present the carbolic acid will probably appear at the orifice. The presence of a fistula adds very materially to the probabilities of success, as it allows a free passage for the medicine through the seat of disease.

Should there be no fistula, the treatment is very much the same, except that, as it is difficult to force the carbolic acid into all parts of a closed cavity by the process mentioned, on account of the presence of air, resource must then be had to the fine probes, working the carbolic acid into the most remote parts. The cavity is then filled with Japanese paper and the orifice stopped with paper soaked in sandarach. This ends the first dressing. The patient is directed, in case of pain, to remove the plug from the orifice. The second dressing is the same as the first; if a fistula is present, and you have been successful in forcing the medicine through it, it will in many cases be found to be closed, but two or more applications are generally necessary. Should it be impossible to force the carbolic acid through, resource must be had to either drilling through the nerve canal into the sac beyond, or to the production of an artificial fistula beyond by piercing the alveoius through the gum. This can be done with little pain by touching the gum with a crystal of carbolic acid before drilling, or preferably by the hypodermic use of cocaine, in which case efforts should be made to keep the fistula open by means of a piece of cotton wool until the treatment of the case is completed. It is seldom necessary to treat the tooth in this way many times; if the abscess does not readily yield to treatment, it will sometimes be found that persistent effort may cure it; but in these obstinate cases the tooth is often eventually lost. It will generally be found, however, by following the foregoing treatment, that eight out of ten cases will be successful.—ELLIOT, *Dental Record.*

DETECTION OF MERCURY IN URINE AND ORGANIC LIQUIDS.

Almén, in *Pharmaceutische Rundschau*, recommends to heat over a slow fire for one and one-half hours, the urine or organic liquid to be tested, to which 8·10 per cent. of hydrochloric acid has been added, with copper or brass wire previously heated to redness. If considerable mercury is present, it will show a white, if not considerable dirty-gray deposit results. When urine is tested, the wire is carefully boiled in distilled water, adding a little solution of soda to remove uric acid or coloring matter; dry on filtering paper, and heat in a sealed glass tube over a small flame. A magnifying lens or microscope will show the mercury if the globules are too small to be seen with the naked eye. The mercury globules appear black by reflected light, often exhibiting a white spot in the center. They can be made to coalesce with a fine platinum wire. By this method mercury was detected in the urine of patients who had been treated by inunction after the expiration of one year.—*National Druggtst.*

THE MATRIX IN FILLING TEETH.

The matrix is rapidly gaining favor, and we believe its intelligent use adds largely to the perfectness of many fillings, and renders operations that are difficult and tedious without its use, comparatively easy and more complete when finished. It gives an easy restoration of natural approximation, without unnecessary separations or wedging, and this is a great point gained. Many operators who experimented with the forms put upon the market at first, were not impressed with the benefits of the system. This result was occasioned partly by the imperfect form of matrices, but chiefly because they were not properly used, and the result was imperfect fillings at one or both of the lateral walls near the cervical border. The fault was in using instruments not adapted for reaching these points, and by the use of cohesive gold. Non-cohesive gold should be exclusively used, until the cavity is nearly full, and each piece of gold should be placed to extend from the lateral or cervical border to the interior of the cavity, and condensed firmly against cervical and lateral borders, and against the matrix and evenly carried up until the cavity is two-thirds full or even more, then finish with cohesive gold. In using the last pieces of non-cohesive do not condense thoroughly, and be sure that the first pieces of cohesive gold added are thoroughly malleted, and secured to the non-cohesive with a sharp pointed plugger.

Formerly the matrix was made only in forms to be secured between two teeth, but while these forms have been greatly perfected, there are now additional forms of matrices designed for a greater variety of cavities. Band matrices designed for teeth that are isolated, and for cavities in the buccal and lingual surfaces, are now made in a variety of forms, and all designed to facilitate the filling operation.

We desire especially to call attention to the admirable way in which the matrix supplements the efforts of the operator, when cement or amalgam fillings are used. In filling cavities with these plastics without the matrix, the filling placed in the deeper part of the cavity is displaced and pressed out by impaction nearer the orifice of the cavity, and the proper contour is obtained with difficulty, and at a sacrifice of solidity and proper joint at some point because there is no wall of resistance. With the matrix this is all obviated, and a more solid and properly contoured filling is the result. In using cement the surface of the matrix next the filling must be slightly rubbed with oil to prevent the cement adhering.

We consider the matrix especially adapted for these plastic fillings, and if the operator who does not use them will commence with their use in the plastics, he will not be able to get along without them; and, while he will find that with gold greater care must be exercised, yet we are satisfied that he will find, that when they are rightly used he will accomplish in very many cases better results with less expenditure of time and brain, and with less pain and exhaustion to the patient.—*Western Dental Journal.*

MUCH MUSCLE—NO TEETH.

The young man—about thirty years of age—is a veritable "picture of health," to all outward appearances, being the recognized champion of athletes in this city. His muscular system is markedly developed, showing the result of his years of gymnastic training and exercise. That he is what he claims to be, "an absolutely well man in every particular," few would question. His teeth have always been good, requiring but little attention, *until* within four or five months. To-day they are almost a total wreck. His dentist, by whom I was called in consultation, has been wholly baffled in all his attempts to stay the progress of destruction. Almost every tooth is just simply melting down, and the various plastic filling materials that have been tried prove utterly ineffectual to arrest the process.

Now the question of "cause" very naturally arises. To my own mind it seems to be clearly of a constitutional nature, and traceable to *too much gymnastics.* The entire *muscular* system has been developed abnormally, at the expense of organs that do not come in for their proportion of the athletic exercise and consequent nutrition. In fact, the blood being constantly determined to the muscular system, the teeth, and probably other organs that are not proportionately exercised with the muscle, fall a prey to the over-developed muscularity of the general system. "The balance among the physical functions" that formerly existed, in this case, has been broken, and the "death" of the teeth "is the result of the consequent local weakness," brought about by the blood and nerve currents being determined from the normal balance.—STOCKWELL, *Archives of Dentistry.*

THE HERBST METHOD.

I think the following points have been established : That a rotary force, appled as described, will condense any form of gold foil ; that it is a safe mode to place in the hands of the most careless ; that fracture of frail walls is impossible with it ; that teeth ought to be preserved, by its use, equally as with non-cohesive foil, tin, or amalgam. With so much in its favor, it is certainly worthy the attention of all operators. That the mallet will be abandoned is not to be expected nor desired. All modes have a value, and will live and serve a valuable purpose. It is for us to aim to find the proper niche for all of these, that those who succeed us may avoid the mistakes of practice and the blunders of unphilosophical speculation. We need to be taught, and it is important we should teach that the only true road to knowledge is through experiment to theory, and not in reverse order ; that no statement, however ancient, is worthy of the slighest consideration unless it be thoroughly sustained by facts ; that a practice is one-sided, and therefore unwise, that deals only with the visible and fails to reach to the minutest manipulations ; in a word, that a practice not based on a reasoning from cause to effect is deficient in the essentials to true success.—TRUMAN, *Dental Cosmos.*

NEW CURE FOR PROFANITY.

A contributor in a homœopathic journal, stated that one of the provings of anacardium was to induce profanity, but he recommended its use only in those cases in which the habit was a symptom of mental disease and not of loose morals. Anacardium, said this writer, cured a minister of the habit. Another remedy mentioned was nitric acid—we presume in very small quantities. We thus condense our correspondent's letter, and merely give his conclusions: " Most of my patients are attacked suddenly, and the paroxysms are very severe. The disease is apt to become chronic, however, if the cause is more or less persistent. An esteemed friend of mine drifted into this form by persisting in using a stylographic pen. I did not know of the new medicine at that time, and so had no opportunity of trying its continuous effect. Although this new remedy may be efficacious in mild cases, where the causes are trivial, in the severe paroxysms I can imagine it would be of small account. In the latter the case assumes that of a pronounced mental reflex, and, for the time being, appears to be incurable. The most marked example of suddenness of attack was in a clergyman who struck the bridge of his nose plump against the edge of a door in a dark room. He was for the time being entirely unconscious of his ejaculations. I have placed him under the remedy, and with a little care in avoiding the cause, he has a promise of recovering his mental equilibrium. Another example of this paroxysmal mental reflex was in the person of a mild-mannered bank clerk who stubbed, his toe during a moonlight stroll on an irregular plank-walk. This man refused to take the medicine until his toe felt better, so I had no opportunity for testing its merits. While it is always best to remove and prevent the cause of profanity, it is well to treat all patients who are predisposed to the disease by a continuous course of medication up to the point of saturation. If this can be done, it is not impossible, perhaps, for the patient to smile complacently when left by his train, or bless his stars when he slips on a banana peel."—*Medical Record.*

THE CHEMISTRY OF SOLUTIONS.

This is a question which vexes the souls of our best chemists, and formed the basis of an interesting discussion at the Birmingham meeting of the British Association. Speaking of the solubility of chemical salts, Professor Tilden said: "What determines the solubility of a substance? Why, for example, is magnesium sulphate very soluble in water, whilst barium sulphate is almost totally insoluble? With regard to salts the following propositions seems to be true: (1) Nearly all salts which contain water of crystallization are soluble in water, and for the most part easily soluble. (2) Insoluble salts are almost always destitute of water of crystallization, and rarely contain the elements of water. (3) In a series of salts containing nearly allied metals, the solubility and capacity for uniting with water of crystallization generally diminish as the atomic weight increases. The fusability of a substance has also much to do with its solubility. Neither fusability alone, nor chemical constitution alone, seems to be sufficient to determine whether a solid shall be soluble or not, but it may be taken as a rule to which there are no exceptions that, when there is a close connection in chemical constitution between a liquid and a solid, and the solid is at the same time easily fusible, it will also be easily soluble in that liquid."—*Chemist and Druggist.*

FOREIGN DENTISTS.

Whatever may be the correct interpretation of the dentists' act as regards foreign dentists, the medical council was of the decided opinion that, of the sixteen dental colleges in the United States of America in 1878, only two should be recognized—the dental department of Harvard and of Michigan universities. Accordingly, the foreign dentists registered are all graduates of one or other of those two universities.

These foreign dentists can be divided into three groups :

(*a*) Those who are registered as having been in practice on July 22, 1878, and have registered an additional qualification—D.M.D.Harv., or D.D.S.Mich.

(*b*) Those who were actually in practice in 1878, but have registered in virtue of a foreign degree only.

(*c*) Those who have been registeren by having obtained since 1878, a foreign degree.

Of those of the first and second groups, there cannot be any question as to their *bona fide* claim to registration among the United Kingdom dentists. The case of those of the third group is different. There are also students who have become attached to these two schools because of the prospects of eventually being able to register themselves as foreign dentists. But the whole question is still *sub judice*, and the decision of the sub-committee of the medical council will not be known for some time yet.—*Dental Record.*

KATZENJAMMER—"CAT-SICKNESS."

I am afraid that Shakespeare was addicted to a mild sort of Katzenjammer. Byron's life was filled with Katzenjammer and the vices incident to night-life. Byron died early of cat-sickness. And poor Burns, instead of going to bed early and honestly like his Cotter, went Katzenjammen like his Tam O'Shanter.

"Gie me a canny hour at e'en,
My arms around my deary."

I am afraid the canny hour with his Anna was long drawn out.

"The Church and State may join to tell,
To do such things ye maun na,
The church and state may gang to hell,
And I'll gang to my Anna."

The Church and State were right and Burns went to his Anna—and his grave. How fares it with us? The army of night-toilers and night-revelers are multiplying. The world of business and fashion dines at six and goes Katzenjammer till the small hours of the morning. Our White House was given over during the last administration to Katzenjammer—and the President is dead.

> "Can these things be
> And overcome us like a summer's cloud?"

The struggle of the organic world is two-fold, for sunshine and for nutriment. What has sent the Sequoia of California springing up into the heaven three hundred and fifty feet? Search for the sun. Environed by shrubs this tree itself would have been a shrub. But its neighbors are pines and cedars which rise to the height of two hundred feet, weaving a curtain of interlacing bows beeween the sun and the weeds below.

Plant your potato in a cellar and mark the pale and sickly hue of the vine which attempts to grow from it. Its disease is Katzenjammer, that is, night-sickness. Look at your pea-nut. Struggle against enemies in the air has driven this member of the pea family to develop its pod in the ground and the vegetal virtues which come from impact of light and actinic beams of the sun are wanting in this plebian nut—which is no nut at all. Look at the mole and then at the bat. Their embryotic history shows that they were derived from a common ancestor. Struggle for life drove certain members of this family higher into the air and others into the ground. The sun-seeker gained in eye and brain. The earth-burrower lost his eyes and retained only brain enough to guide it through the ground. The bat lapsed when it fell into Katzenjammer, that is, night-prowling.

I do not know what was the health of the tiger and lion before they went into Katzenjammer. The dissecting knife of Gerard shows that now these nocturnal felines suffer much from consumption. I know not the flavor of the ancient pea before it became a pea-nut. I know that the topmost, sun-drinking peach has a richer flavor than the peach below. I know the character of the ancient orange which grew in the shaded recesses of the tree, for it survives in the wild orange. I know that the fruit grew luscious as the tree learned to push it out on the sun-lit periphery.—GUNNING, *Open Court.*

BEANS!

1st. Soak a quart of beans over night in two quarts of cold water.

2d. In the morning turn off the water, add fresh water and boil them till the membranes begin to separate; turn off the water.

3d. Put the beans in a baking pot, with half a pound of salt pork buried in the beans, add two tablespoonfuls of molasses, and cover the whole with water. Bake in a slow oven all day; a baker's oven is best. Watch the beans, and if they become too dry add more water. When thoroughly cooked it will be known by the softness of the beans in the mouth between the teeth, by the taste, and by the microscope showing the starch grains broken up and mixed in one homogeneous mass that will not polorize light with a selenite plate.

4th. Take time to eat, and chew thoroughly.

5th. After eating, go out in the open air and walk or work. Do not go to church right after eating baked beans; they will stay in the stomach and their indigestion will do much towards spoiling the enjoyment of the exercises there. Dyspepsia and religion do not go together well, but good digestion and holiness are twins. Holiness, health, whole and hale, come from the same root. A holy man is a healthy, whole man, with all the functions in good order and no dyspepsia. Dyspepsia is a physiological sin.—CUTTER, *Albany Medical Annals.*

PLACING GOLD CROWNS.

I have never been thoroughly satisfied with the manner in which gold crowns have been cemented to the root. Of course we make the ferule or band fit as close as possible, even to driving it on. But when we put them home to stay are we *sure* the enlarged nerve canal is well filled around the pin or post? Are we sure there are no air bubbles between the root and the cap? Are we sure our cement will not deteriorate at the edges of the inverted cup under the gum? Not quite sure. Well, I try to be sure that my caps and crowns are. I leave a vent hole in the crown, but fill my cap full, as well as the stump, of cement before I press or drive the work home. I have my rubber dam adjusted and put a cement of dissolved gutta-percha *around* the stump before I put the cap home for good; thereby being assured that my joint is gutta percha instead of sulphate of zinc, which we all know is preferable. With the vent hole for the surplus I can use stiffer cement than I dare to without it, afterward I can fill that hole, and am satisfied I can make better work than I can with thin cement, expecting the pressure of putting home my work to drive out the fluids through a joint I deem absolutely necessary to have so perfect. I know it is generally thought best not to have the vent, but I use it and am satisfied with it. I have never been satisfied with porcelain faced crowns (anterior teeth) until I tried making my posts into tubes, thereby allowing the surplus cement to go over and out through this hollow post when being sent home for good.

Reliable operators have told me that a pin or post attached to the crown was not to be trusted, that they would "come home to roost," but I have the first one thus handled to give trouble. But when I used the thin cement, no vent, no gutta-percha, and solid posts, I was sometimes bothered with unsatisfactory results and chagrin. With the rubber dam adjusted and the gutta-percha cement in place, root and cap filled with oxy-phosphate, I carry it to place as far as the clamp or rubber dam, quickly remove the clamp and dam with the disengaged hand and send it home. Try it.—Howe, *Western Dental Journal.*

BEER YEAST AS A THERAPEUTRIC AGENT.

The European medical press has circulated very largely the assertion that during cholera epidemics the employes of breweries have been singularly free from the contagion. The experiments with beer yeast, made by Herr, the attending physician of the penal institution at Ratiber, as communicated by him to the *Deutsche Medizinische Zeitung*, may be of considerable interest. He says that he had noticed more than twenty years ago that, in more than four hundred cases, pure beer yeast would rapidly cure scurvy, and that its use was without danger or even the slightest unpleasant consequences.

In 1866 he tried the same remedy in the treatment of cholera, and met with better results than with any other mode of treatment, and thus came to the conclusion that the yeast plant was an antagonist of the comma-bacillus as well as to the microbe causing scurvy, and that thus a remedy was found which, without injury to the human system, would deprive these bacteria os their sustenance. The following were the conclusions arrived at:

1. Yeast is probably a powerful remedy for zymotic diseases, and in scorbutis and purpura, undoubtedly so.

2. In several cases of well-advanced tuberculosis I have seen it overcome high febrile conditions followed by a well-established arrest of the solidifying of the lung tissues, which had progressed several months.

3. The exhibition of yeast is very easy; doses up to two litres per day were given without the slightest bad results.

4. The remedy is readily taken by the patient and replaces the use of milk.

5. By its easy assimilation it becomes a nutrient.

Herr suggests the administration of beer yeast in diphtheria, and hopes for the best results from its use. As beer yeast can be obtained at any lager beer brewery, it would seem as if our physicians should give this new remedy a thorough trial, remembering, in this connection, the good effects generally obtained from the use of the old-fashioned yeast poultice.—*American Analyst.*

AN IMPROVED ELECTRIC MOTOR.

It supercedes the ordinary dental engine, has far greater velocity, and ample power for any operation in the mouth in which an engine is employed. The engine with its switch board and attachments are well nigh perfect. The power, of course, is derived from a battery, and one has been secured for this motor that seems to posses almost every reasonably quality. It consists of six cells, or jars, 6x8, placed in a box. The battery needs but little attention. It has two fluids, one of which requires to be changed once for every 75 to 100 hours of actual work ; the other will give from 400 to 400 hours of efficient work without change or addition. Except when necessary to change the fluid, the battery must not be touched.

Two or three cells give ample power to run the dental mallet and the electric mouth-lamp as well.

The cost per hour for actual work is less than one cent, as there is practically no consumption of material when the battery is at rest. A gentleman who has quite a large practice has had his motor and battery in constant use for over three months. The battery has required only a few minutes attention during that time. Probably less time and attention was given it, than would be required by an ordinary dental engine. We have had this motor in use for about two weeks, and thus far it has rendered entire satisfaction, and the feeling is that a return to the ordinary dental engine would be a backward movement.—*Dental Register.*

"THE PRESENT RELATION OF DENTISTRY TO MEDICINE."

A paper bearing the above title was read by its author, Dr. Norman W. Kingsley, at Newark, March 20th, before the Central Association of New Jersey. It forms his second written contributions on the subject, and with his "Dentistry not a Specialty of Medicine," before the New England Dental Society, and Dr. J. Foster Flagg's masterly effort on the same side at the meeting in question, seems to cover the ground thoroughly, and present an unanswerable exhibit in dentistry's favor as a profession, and against its being a specialty of anything. We make a few extracts.

The opinionated, great and small, are touched off in this wise :

Men who never had any opinion before are suddenly vitalized, and dentists with a medical degree, dentists with a dental degree, and dentists with no degree; and men whose reputations are international, existence is a myth beyond a very limited clientelle, rise to a question of privilege, and clamor for notice.

He then discusses terms, and later pounces on the notion that there are but "three professions," a statement that smacks of "earth, air, fire and water :"

I have heard it gravely stated before a dental society—"*there are but three Professions*, LAW, THEOLOGY, and MEDICINE."

Now the absurdity in this day of progress of intimating that no new profession can arise, and that every new development of science must of necessity come within the scope and become a speciality of one of those three professions, must be apparent to any one whose mental growth is not stunted by antique dogmas. As well might you say that authors, actors, journalists, artists, engineers, arthitects, etc., do not belong to "professions," except in so far as they are specialists in one of the three above named.

As to colleges, graduates and degrees :

There are now in this country more than twenty dental colleges which profess to teach *everything* that a dentist needs to know for the practice of his profession, and many of them are fully up to that standard, and at the end of every session each one of them launches forth upon the world a greater or a lesser number that it certifies are qualified to practice the profession of dentistry, and confers upon each one the degree of a "Doctor." Are those certificates lies?

So long as we maintain separate organization and distinct institutions of learning in which we qualify men to enter and practice the profession of dentistry, conferring upon them a distinct degree, just so long will we be "an independent profession and not subordinate to any other." And not until the degree of "Doctor of Dental Surgery" is recognized by the organized medical profession as entitling its holder to membership in medical associations can dentistry be considered in any other light than an independent profession, and that condition of things is not likely to ever occur.

And this is how it came about :

Dentistry has become what it is by its own efforts and without any fostering care from medicine either as a profession or an organization. Medicine never was and is not now its nurse. The dental profession has had to fight its way to recognition as a scientific organization in the face of sneers, ridicule and contempt, which even in medical journals has not yet ceased.

What a commentary it was on "Dentistry a SPECIALTY of Medicine" to view the proceedings at the great anniversary meeting of the District Society in New York, in January 1887.

There was the largest assemblage of dentists that the world has ever seen. There was a series of clinics and demonstrations, running through all the hours of two days, that was almost bewildering in its vastness and comprehensiveness. Almost every operation in dental surgery and dental prosthetics that has any value was performed before that multitude.

The evenings were given over for three hours each to papers of great scientific value, and yet during all that prolonged exhibition, out of the five thousand medical men in New York city and immediate vicinity, not one ever showed his face, so far as I can learn, nor have I been able to find the slighest allusion made to it in any medical journal, and yet we are told that dentistry is a specialty of medicine.

What a terrible satire all that magnificent contribution to the advancement of our profession is upon the belittleing assertion that dentistry is a *specialty* in medicine.

He resents an imputation:

I will not allow those who differ with me on this general subject to make me appear as without respect for the profession of medicine.

The honest, conscientious, learned, scientific and sympathizing physician is entitled to the highest rank in the estimation of his fellow beings. He is of more value and more importance from the hour of our conception to the moment of dissolution, than the follower of any other vocation, not even excepting he who claims to be our spiritual guide.

If I were to put in language the full meausre of my profound regard for the true physician, I should only express what has been better said a thousand times by others, and what every soul of us believes and feels.

And here is some good advice :

If gentlemen wish to practice medicine, or be considered practitioners of medicine, let them go to a medical college, take out a degree, and then practice legitimately; but do not attempt to get into the ranks of a medical fraternity under the cover of dentistry, without even the degree of a dental college.

Then follows a consideration of international medical and dental congress schemes, and a successful effort to show that there need be no conflict whatever between the two. The entire paper is the property of the DENTAL REVIEW, and will be accompanied. if we are rightly informed, by Dr. Flagg's remarks at the New Jersey society's meeting.

Doctor : "Ah ! looking badly yet, I see. You have evidently not been following my instructinons about taking exercise." Patrick : "Yis ; I walked half a mile yesterday." "Good. You remember I told you that you must always have some object in view when you walk, so as to get your mind off your troubles. I hope you made yesterday's outing a matter of business of some kind." "Yes ; I went and bought a grave."

CONDUCTOR'S DEPARTMENT.

STATE SOCIETY MEETING—MAY 11 AND 12.

The next annual meeting, the Nineteenth, occurs at Albany, Tuesday and Wednesday, May 11th and 12th, and promises to prove more than usually interesting.

The programme announces the "Annual Address," by President Norman W. Kingsley ; "Legal Decisions relating to Dentistry," by Daniel Vason, Esq., a well-known member of the New York bar ; a symposium of three papers on "Teeth with Dead Pulps, without Fistulae, and the Filling of Roots," by (*a*) Dr. J. Morgan Howe, (*b*) Dr C. S. Stockwell, and (*c*) Dr. F. Y. Clark ; a symposium of two papers on "Implantation," by (*a*) Dr. G. L. Curtis and (*b*) Dr. G. W. Weld ; "The Laboratory, with Demonstrations," by Dr. G. W. Mellotte; and, probably, essays in competition for the Whitney prize, volunteer papers, and the usual incidents of office practice.

This is an elaborate programme, and in order that justice be done it, every moment of time from 10 A. M. Wednesday until adjournment, must of necessity be fully utilized. The business of the meeting will be disposed of the first session, and as completely as practicable, leaving the following sessions for the reading and discussion of the several papers, which are by gentlemen who cannot help making what they have to say both interesting and profitable.

Then in addition to the above we are to have something of value from the committee on "Dental Practice"—Drs. E. Parmly Brown, C. F. W. Bodecker, and W. C. Barrett. Except on one or two occasions years ago, this subject received little or no attention from those to whom it had been assigned; but this year things are different—there has been much done, and the review, commentary and critical character of the report, promises to make the discussion of it a lively one.

For this prospective feast, the society is indebted to the President of the society, and Dr. Chas. F. Ives, of the business committee, who is also, by the way, "a member of the Cabinet."

To every member of the state and district societies we would say—"Keep your appointment book clear for May 11th and 12th, at least. Go to Albany, and stay there and at the meeting until final adjournment.

The microscopist of the dental profession are after that "umbilical cord" said by Dr. Marvin to connect dentistry as a specialty to medicine. Japhet in search of his father made the journey in less time that it will take those now living to reach the placental terminus.

OUR FRONTISPIECE.

With this issue we present our readers with a picture of the at present best abused man in dentistry, and without his knowledge or consent. It is from a bronze plaque by himself, a copy of which we have owned a year or more, and rated high as an art treasure. To those not already acquainted, we introduce Dr. Norman W. Kingsley.

NEW YORK ODONTOLOGICAL SOCIETY.

At a meeting of the Society held April 12th, a paper entitled "The significance of the natural form and arrangement of the dental arches of man, with a consideration of the changes which occur as a result of their artificial derangement by filing, or by the extraction of teeth," by Dr. I. B. Davenport, of Paris, was read, and illustrated by models and large drawings.

At 4 o'clock of the same day a committee of members of the Society gave a dinner at the Hotel Brunswick.

HIT HARDER—GROW SHELL.

"Observer," New York correspondent of *Archives of Dentistry*, says: "One of the greatest weaknesses of our societies is so much wholesale approval of what is presented, and the prevailing idea has crept in that it is a mean thing to dissent."

We are all a little tender perhaps in this respect, and simply because we lose sight of the fact, or what ought to be the fact, that the member yonder is fighting the idea, and not the man who presents it. It was that prince of hard hitters, Atkinson, who once said to a tenderling,—"You'r too much like a jelly-fish; what you need is to grow more shell."

WHICH?

"Fang" is English; "root" American. When "The serpent showed his fangs," which ends of his teeth did he place on exhibition?

PELLETS.

The Microscope, under its present management, is improving with each issue.

The Ohio College of Dental Surgery graduated a class of twenty-nine March 2d.

The Fifth District Society met at Utica, April 12th and 13th. A good time was had.

Life cites the case of a dentist who recently failed because another man had a better pull than he.

The Eighth Society meets at Buffalo the 19th and 20th of this month. Seven papers are announced.

That was a great meeting of the First District Dental Society in January. Read the doings in the monthlies.

The New York College of Dentistry graduated 51 D. D. S.'s last month. Number of matriculates for the session 193.

Don't address him as "Professor," unless you have a policy with a clause providing against violence at the hands of the other fellow.

The Minnesota Hospital College, medical and dental, held its sixth annual commencement March 11th. Prof J. E. Bradley, addressed the class.

We are indebted to Dr. A. F. Lautz, of the graduating class, for certain favors in connection with the commencement exercises of the Baltimore College of Dental Surgery.

The coming profession is electrical engineering. The calls for men to take charge of electrical matters are without number, and Edison says there's not enough material at hand to even make a beginning.

Last year members of the State society were not enjoying their usual good health, hence the lack of interest in the proceedings. Judging by what we hear, there is this year not only the normal amount of the commodity in question, but a good surplus. The Society is always very democratic, and members take little or no pains to spare each other's feelings, from which the reader may infer that a coattail that touches the floor will be "trod on wid alacrity."

"Eureka Bendall" gives the true story of Sir Isaac Newton and the apple, saying among other things: "One sultry but historic afternoon, between terms at Cambridge, Newton was seated under a gnarled apple-tree in his mother's garden * * *. High over his head a June-bug burrowed deep into the plump cheek of a large horse-apple, swaying it gently on its stem. Suddenly the leafy canopy parted, and, cleaving the air, fell with a mellow thud on the head of the absorbed student, who, starting from his brown-study, instinctively exclaimed, 'Foul, and out!' * * * at the same time taking in the gravity of the situation."

I. M. C.—SEND ABSTRACTS!

Will you allow me to request those of your readers who will assist in the Dental and Oral Section of the International Medical Congress to furnish me with an abstract of their papers, or the papers themselves, at once?

These papers must be in the hands of the Secretaries as soon as possible, in order that a definite programme may be arranged, and a proper time appointed for each subject.

E. A. Bogue, Secretary.

29 East Twentieth Street, New York.

SEVENTH SOCIETY.

The Seventh District Dental Society of the State of New York will hold its nineteenth annual convention in Rochester, Tuesday and Wednesday, April 26th and 27th.

Dentists of the Seventh judicial district of the state, who wish to become members of the Society, should make application to the chairman of the board of censors, Dr. H. C. Knickerbocker, Seneca Falls, before noon of the first day of the meeting.

Members of the profession are invited to be present.

Chas. T. Howard, Rec. Sec.

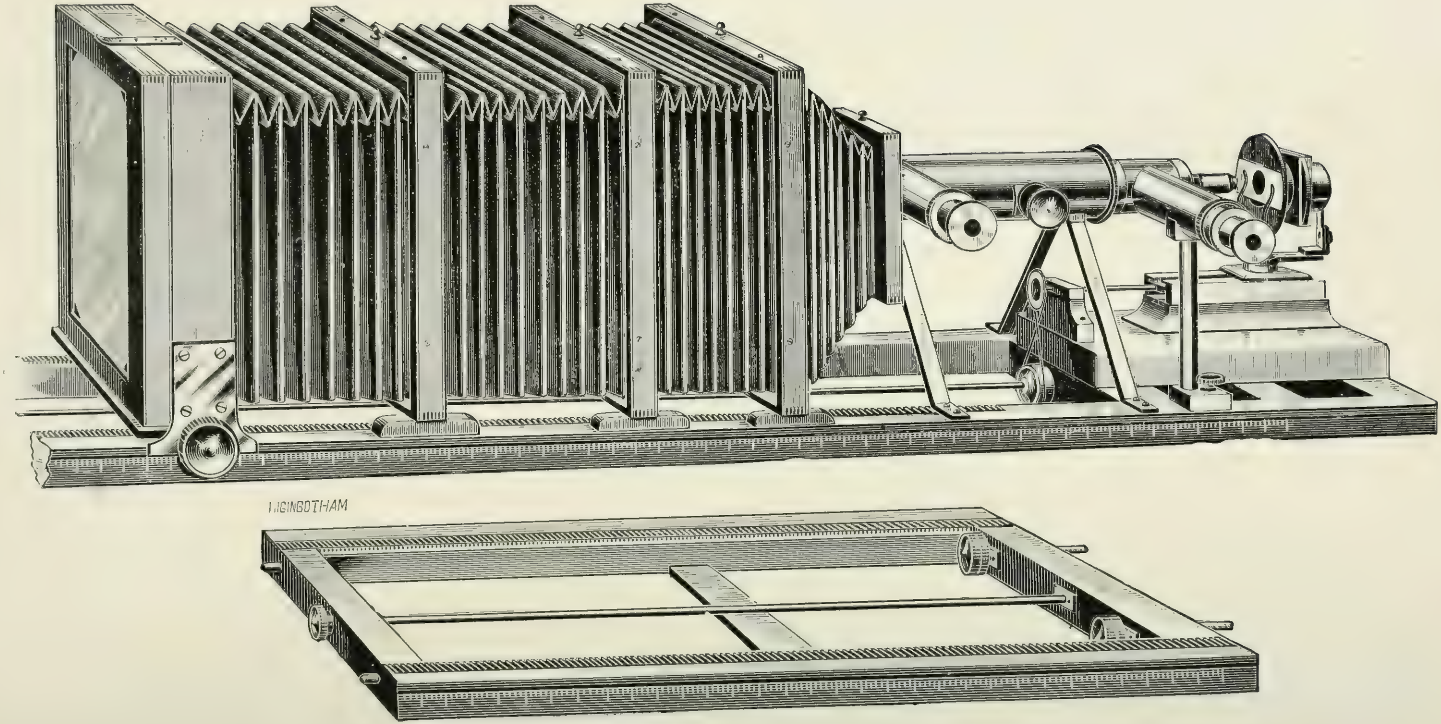

FIG. 13.—THE PROFESSIONAL PHOTO-MICRO-CAMERA.

THE

Odontographic Journal.

VOLUME VIII.—*July, 1887.*—*No. 2.*

PRESIDENT'S ANNUAL ADDRESS.

[Delivered May 11th, '87, before the Dental Society of the State of New York, at Albany, by Norman W. Kingsley, D. D. S., M. D. S.]

Gentlemen of the Dental Society of the State of New York:—

It is with a mixture of pride and timidity that I occupy the chair of your presiding officer: timidity because for nearly twenty years I have acted my part in the ranks on the floor of the house and have grown so accustomed to its freedom that in any other station I feel out of place. Nevertheless I recognize the honor and am proud of the compliment. It came to me in my absence from the society, in a season of doubt, and at a time when I feared I had lost the confidence of my fellows. I was seriously contemplating a withdrawal from all public connection with my profession when your summons came, like the cry of "to arms" to the sleeping soldier which rouses him to instant action. I thank you for this evidence of your respect.

The Code requires that at this time I shall make an address and "give a concise statement of the condition of the State and District Societies."

The condition of the State Society is prosperous in an eminent degree.

The standing committees have done their work faithfully and well.

Your committee on dental law has been vigilant and energetic, and unlawful practitioners have ceased to practice or been driven from the State. Your attention is particularly called to the report of that committee as containing suggestions of the need of further legislation by the State. I hope this will receive your careful consideration and no hasty or inconsiderate action be decided upon.

In the report of the Committee on Practice there will be presented many new methods of recent introduction, which are the natural outgrowth of the prolific inventive faculty which is exhibited in such a marked degree by dentists.

Without anticipating that report I wish to make a note of three characteristics which peculiarly mark the past year, and, taking them in the order of their occurrence:

1st, The visit of Dr. Wilhelm Herbst, of Germany, in July last, and his repeated and almost innumerable demonstrations of the system in operating with which his name has been identified. We were thus enabled to see at the hands of the master himself the practical application of his own very ingenius ways. There were so many that were unique that it might almost be said that he had a complete as well as an original system.

2d, At the meeting of the American Dental Association in August, Dr. Knapp, of New Orleans, and Dr. Mellotte, of this State, showed more marvelous products of their skill in prosthetic dentistry than have ever been seen before. The demonstrations of both of these gentlemen, as well as the exhibition of their appliances, entitle them to rank as artists as well as wonderful inventors.

3d, That which may possibly prove of more importance than either of the preceding, was the visit of Dr. Younger, of California, with his extraordinary feats in dental surgery.

These three topics will come up, in one form or another, at this meeting, and I am not without hope that your discussions will prove a valuable contribution to dental science and dental literature.

It is with pardonable pride and not with vanity that I refer to the work of the district societies in this State during the past year. I cannot speak of each one and give to each its full measure of credit. Of some I only know by common report of their active interest in the advancement of our profession, but of others I have personal knowledge, and can thus be excused in giving them special praise without being charged with invidious distinctions.

In October last there was a combination meeting of four of the district societies at Rochester, continuing through two days. It had the full complement of scientific papers, discussions and clinics, and in point of attendance, interest and scientific value was quite the equal of many of the meetings of the State society. The grand banquet which followed was honored by representatives of all the learned professions, who were alike honored by being there. This Rochester convention is likely to become historic, as being the first association of dentists to declare by formal vote that "dentistry is practically an independent profession."

The crowning achievement of the year was the gathering in New York in January, under the auspices of the First District Society. During three days at that time there was the largest assemblage of dentists that the world has ever seen. The clinical demonstrations were so vast and varied as to be almost appalling. Apparently nothing of a practical nature in dentistry but was exhibited and put to practice. The numbers, the interest and the character of the assemblage would entitle it to be called a *congress* of the dental profession rather than a meeting of the First District Dental Society.

During the past year two valuable benefactions have been placed at the command of this society; privileges that have been given I believe to no other society, state or local, in the world. It is a mark of respect which we should not lightly esteem. With a view of encouraging laudable ambition and the development of natural talent, the Baltimore College of Dental Surgery and the New York College of Dentistry will each receive annually one student from the State of New York without payment of tuition fees.

The conditions of this free scholarship are *1st*, That the applicant is financially unable to pay for his tuition; and *2d*, That he shall be recommended by the State Board of Censors, acting for the society, after an examination by them into his general character, culture and fitness to do credit to the State which sends him, the college which educates him and the profession which he is to follow.

I regret that this arrangement with these two institutions was not definitely settled in time to have been announced in the programme of this meeting issued by the secretary. When this opportunity of obtaining free tuition in two of the best dental colleges in the country is generally known it is hoped that such advantage will be taken of it as will induce sharp competition and commendable rivalry for the coveted prize. I would recommend the formal acceptance of these benefactions and the appointment of the Board of Censors to carry out the terms.

There is a singular error in the wording of the third rule of order, Sec. 60 of the Code, which should be corrected. It reads now, "No motion or speech shall be in order until the mover or speaker shall have been recognized and assigned the floor by the chair, nor shall a motion be open for debate until seconded by the chair." It would be clearly in violation of all parliamentary usage for the chair to be obliged to second all debatable motions.

I have been for many years impressed with the chaotic condition of our legal relations to our clients, and their legal relation to ourselves. No one likes to submit to injustice. There is an instinctive rebellion against imposition and injustice, and when one finds that he has been the victim of a wrong he naturally looks to the law for relief. But what is the law ? It is this query that has come up to me frequently, and no definite answer has ever come from any accepted authority. Law for the protection of life, law for the protection of property, and law for the government of corporations is pretty well defined; but of law governing the relations of a dentist to his patient, and *vice versa*, there is little or none. Of law on the statute books there is none, and therefore all the law there is which specially applies to dentists must be found in the decisions of judges upon cases which have been tried before them. So far ar I know there has never been any collation of such decision, and thus it has come about that if a dentist found himself in litigation he was very much at the mercy of his lawyer, who might be all at sea, or a judge who knew no precedents, or an ignorant jury actuated by prejudice.

Believing that a report of some such cases as had been tried would be of value to the society, I enlisted, several months ago, Mr. Daniel Nason, a member of the New York bar whose education and attainments fully qualified him for that work. To find all that has been recorded in Great Britain and America, to analyze it and sift out typical cases that contained a principle, has involved an undertaking of much greater magnitude than either of us contemplated in the beginning. I believe, however, that his report, which will be made here, will prove of very great value and will tend to avoid litigation; it will certainly further the ends of justice.

Within the last year dental politics have occupied the attention of the profession more than at any time in our previous history. Men have been ranging themselves upon one side or the other of a line which makes a distinction between dentistry an independent profession, and dentistry a specialty in medicine. Never before have the opinions on one side or the other been so pronounced; never before have men stopped to consider so carefully the relation that a dentist holds relatively in the professional world. Never before has the sentiment found utterance that the opinions of any man were capable of arresting the advancement of the profession in science, in culture, or in professional status.

The onward progress on each of these lines is as inevitable as the march of events. The dogmatisms of men on one side or the other serve only to set men thinking, but do not establish results. The agitation of the subject developes a confusion of ideas upon facts and politics. That dentistry is a branch of the healing art no one will dispute. That it is *now* an independent profession no one ought to dispute. That it ought to ally itself with medicine and become a specialty in it is a matter of politics and a question upon which men may reasonably and conscientiously differ. My own views have been so distinctly asserted and are so well known that it is unnecessary to repeat them. The history of this society and the work that it has done is the practical embodiment of these views. It is one of the very best illustrations of the application of those views to actual practice.

The dental profession stands to-day, in the State of New York, in the very front rank in respect of organization, scientific attainments and practical skill. In energetic advancement of professional condition and *esprit de corps* it is second to no other community upon the globe. We say this with pride, and with still greater pride because it has all been attained without the fostering care of any other profession, but solely as an independent one. As dentists, and not as specialists in medicine, we went before the Legislature nearly forty years ago and obtained a charter for the first dental college in this State. As dentists again we applied to the Legislature and received a charter for the New York College of Dentistry. As dentists we went to the Legislature and obtained the act which recognized our distinct status, and prescribed conditions for the organization of societies and for some censorship of the qualifications of those who were in practice; and still later as dentists we obtained from the same high authority the power to regulate the practice of dentistry in this State to such an extent that arrant quackery and charlatanism have been almost entirely driven beyond our borders!

All this has been brought about by dentists in their associated capacity, but acting independently of all other associations or professions. And during all this time the medical profession, the legal profession, and an innumerable number of other organized associations, have been regulated by Act of Legislature, each one absolutely independent of every other one. The influence, the reputation and honorable standing of this society have been achieved through its independent organization. Where would we be to-day if a less liberal Legislature had denied our application and relegated us to the State Medical Association to form a section in it. We should have started on our race handicapped beyond redemption by this generation.

I call these organizations, associations and the management thereof the politics of the profession, but its politics are intimately connected with its advancement, its culture and the development of its skill. It is largely through our independence that our *esprit de corps* is maintained. We are what we are because we feel that we stand upon our own ground and are judged by our deserts. Gentlemen, this is the dental society of the State of New York, it is not the dental section of the State Medical Society

I have spoken somewhat of the occurrences of the past year. I have now a few words about the future.

There is to be an International Medical Congress in Washington in the early part of September next, and the managers of that congress have seen fit to promote a section of oral and dental surgery. Oral and dental surgery *per se* unquestionably belong in a congress which is intended to include all there is of medicine and surgery. Naturally all those gentlemen practicing dentistry who regard dentistry as a specialty in medicine would be anxious that such a section on American soil should make the most creditable presentation possible, and equally those who view the profession as an independent one would like to see an International Dental Congress. Whether it was wise or not to undertake all the enormous labor, the mental strain and the expense of building out of a section in a medical congress a creditable presentation of dentistry in America, it is too late to undo what has been done. Dentists in foreign lands have been enlisted in the scheme to promote this dental section, and encouraged with the idea that their fondest hopes of seeing dentistry in America in its fullest expression, would be realized, they are making preparations to visit us. Hospitality forbids that we give them the cold shoulder.

Let us be true to our generous impulses, and whenever any number, great or small, of reputable members of our common profession pay us their respects, welcome them with the warmth of brotherly affection. If the dental section of the International Medical Congress prove a success we shall all rejoice; if it prove a failure we will all unite in one grand effort to have an International Dental Congress which shall redeem all the mistakes.

Gentlemen I pray you that this meeting may prove beyond a peradventure; that the report of the committee on ethics made a year ago, was then and is now absolutely true, "the dental society of the State of New York is in perfect harmony with itself and the whole human race." If any tomahawks have been newly sharpened and brought here, let them be broken on the door-sill, and let us inaugurate in these new quarters an era of fraternal regard that shall not end even if the Dental Society of the State of New York should cease to exist.

TEETH WITH DEAD PULPS, WITHOUT FISTULÆ, AND THE FILLING OF ROOTS.

Paper No. 1 of Symposium A.

BY J. MORGAN HOWE, M. D., D. D. S., NEW YORK.

[Read before the Dental Society of the State of New York, May, 1887.]

Believing that there is much to be learned about pulpless teeth, I am persuaded to present some facts and deductions on the subject, at the request of your committee, hoping that comparison of views and discussion, may bring some truth to view, but not with any idea that I am able to pronounce finalities. There is much difference of opinion on this subject, and advances in knowledge of pathology, and of treatment are mostly to be gained by interchange of thought and experience. We all desire to do that which seems safest and most certain for the cases coming to our offices, and very naturally hesitate to resort to new methods having the suggestion of experiment about them, for the purpose of instituting comparisons; and even when this is done, the limitations of private practice are such that results can only be attained after considerable lapse of time, and they can include comparative so few cases as to make them less conclusive than could be desired. Hospitals and dispensaries are the field from which results of various means and methods of treatment might reasonably be expected, and it has occurred to me that the dispensaries of twenty-six colleges in our land have opportunities of recording and tabulating results of various methods of treatment which would be of great value to the profession, if the authorities of these educational institutions made an effort to utilize the immense clinical material they control for the benefit of the profession, and for scientific advancement.

In the consideration of the subject I shall not weary you by attempting to be exhaustive, but will touch upon some salient points concerning which there is perhaps the greatest disparity of opinion. Leaving out special consideration of teeth whose pulps have been intentionally devitalized by the dentist, we have those whose pulps have been dead for an indefinite period, presenting various phases and phenomena which ought to be interesting, and are certainly troublesome and disconcerting to the practitioner. One prerequisite to the successful treatment of all teeth whose *pulps are dead*, and one which seems to be too little appreciated, is to obtain as direct access to the apical end of the pulp canal as is practicable by drilling or cutting away any portion of the tooth that obstructs, or makes such access more difficult. No part of the tooth need be recklessly sacrificed ; but on the other hand no hesitation should be felt in cutting away sufficient to permit the most thorough removal possible of all disorganized matter from the canals, and the most perfect possible filling of the canals afterward. Of what benefit can it be to spare a portion of enamel or dentine which in any degree prevents such necessary procedures, and thereby increases the probabilities of future irritation of peridental tissues, and may cause the ultimate loss of the tooth ? The sacrifice of a large part of the crown of any tooth, if necessary to attain the end, would be preferable to jeopardizing the health of the root. These remarks, however, are not intended as an indorsement of the practice of using engine burrs in root canals any further than can be done with absolute certainty that they are following the canal ; and this would restrict them to a very limited use, in merely enlarging or making more accessible the entrance into them. Educated fingers are often unreliable when the reaming tool is directly in their grasp, but if the engine hand piece is around the rapidly revolving tool, they can tell almost absolutely nothing as to where the point is going. The *greatest* care is desirable in all efforts to enlarge canals to avoid passing a drill through the root of a tooth at any other point than at its apex, and even this is undesirable unless *required* for drainage.

Dead pulps may be opened to external influences, or closed in by fillings, or by unbroken walls of dentine. In either case the teeth may be perfectly quiescent and comfortable, or may be the location of any grade or degree of pericementitis. Disorganization of the pulp tissue takes place after loss of vitality, but *putrefaction* cannot occur without access of the micro organisms which promote this process. This condition being fulfilled in an exposed dead pulp, it may always be assumed that it is putrescent. Free exit of this mephitic matter into the mouth, with much more difficulty of its escape through the apical foramen may, and often does result in the th remaining free from perceptible pericemental irritation for an definite period, but when these mechanical conditions are relatively anged, the tissues of the socket suffer from contact of putrefactive organisms or the poisonous results of their existence, and inflammation results as an acute or chronic process. Acute pericementitis under these conditions may generally be terminated in its earlier stages by removing all debris from the root canals so as to reopen this obstructed vent. When it has passed the stage in which this procedure gives relief, non-irritant antiseptics, as iodoform in solution, or creosote, or an anodyne, as wine of opium, applied in the root canal may be effective, and counter irritation applied to the gum is sometimes helpful, but these expedients are perhaps as likely to fail as to succeed; active constitutional treatment if intelligently used will generally be much more effective. The recognition that has been given to the efficacy of systematic treatment, in the new "American System of Dentistry," is, I think, a gratifying evidence of progress. Chronic pericementitis frequently results in abscess by the time the case comes under treatment, and a blind alveolar abcess is a condition that—I feel warranted by experience in saying—should be treated with *distinguished* consideration. Haste in permanently closing the aperture through which any abcess has had vent or drainage, is always attended with risk of unfavorable consequences; and in the case of alveolar abcess, although immediate symptoms of irritation may not result, we are not on that account warranted in proceeding to fill the root until we have a reasonable certainty that the abscess, as such, is destroyed, and the process of repair is begun. The cleansing of pyogenic tissues and the application directly to them—if that were possible in these cases—of antiseptic or other medicaments, would be of itself no assurance that suppuration will not continue, and would not therefore justify proceeding as if it had actually been arrested, and the process of repair begun.

So much patience is often required in dealing with such abcesses, and so great are the difficulties of evacuating the pus and applying successful treatment to the pus cavity through the foramen of the root, that wearied with the monotony of unfavorable condition, we are prepared on such occasions, if ever, to resort to the use of some new remedy, which some one has somewhere recommended as the best of all. I have in this way discovered in what irritable mood the tissues sometimes are, that constitute the walls of a blind abcess. After using tereben several times for deodorizing or disinfecting root canals,—which it does very perfectly—an obstinate case of chronic, blind abcess, in connection with a lower bicuspid, induced me to apply this drug in the canal of the tooth. Within three hours pain was severe, and acute inflammation resulted, continuing thirty-six hours before I succeeded in arresting it. A similar result, much less severe in degree, has several times resulted from my use of peroxide of hydrogen in efforts to cleanse blind abcesses, and eucalyptol recently roused the inflammatory fires, in an abcess of this kind, with such intense manifestations that I was persuaded to remove the tooth, whose chances of permanent usefulness I had previously considered rather poor. These may be exceptional instances of the action of these drugs, for they have each of them been recommended for the condition; they serve to illustrate my statement however, that a blind abcess presents an irritable condition of the tissues, and had better be treated, I think, with medicaments incapable of producing such results as I have described. I have known carbolic acid to produce irritation in these cases, but not so severe and persistant as the remedies before mentioned. The treatment that has been most uniformly successful in my hands has been to remove all debris possible from canals and if no purulent discharge can be perceived, dress loosely in the canal with etherial solution of iodoform, covering with cotton, in which very little sandarac or other gum varnish is absorbed. If this produces no discomfort from pressure of purulent matter or mephitic gases in forty-eight hours or more, the same dressing may generally be stopped in with gutta-percha, and the case conducted thence by one or more repetitions to a speedily successful termination, with root-filling; but, if on cleansing the canal a discharge can be observed coming through the apical foramen, I would apply no medicament, but stop the cavity very loosely with cotton, to secure drainage of the abcess and exclude food from the cavity, and later follow with the treatment before described, but being more careful to allow some discharge by applying the dressing very loosely.

Ordinary blind abcesses will generally be cured by such treatment without unusual delay, but when suppuration has been long continued and the apex of the root is denuded of pericementum by the destructive process, the chances of cure are much less, because the end of the root acts like a foreign body in the tissues; in many cases it is eroded by the purulent accumulations, or has granular calculus deposited on it, and in most cases whether these latter conditions are present or not, is an irritant which tends to promote continued suppuration, so that the most certain way of effecting a cure is to amputate the portion of the root thus affected. I have always heretofore accomplished this, with a burr, with the tooth *in situ*. It may be a fair question whether extraction for the purpose of more perfectly accomplishing this object, and replanting, might not produce better results.

When a dead pulp is sealed in from external influences, the tooth may remain for years without giving perceptible offence to the surrounding tissues, and unnoticed by its owner. During this time the pulp has been disorganized, but, as before remarked, putrefaction has not taken place unless the micro-organisms peculiar to this process have had access to the pulp canal. I infer that during the period in which the nutrition of the percimental tissues is not affected, *bacteria* are not present, but that irritation, inflammatory changes and suppuration are easily accounted for by the theory that organisms or spores have found entrance through the apical foramen to a condition so favorable to their proliferation, and that the immensely multiplied organisms themselves, or the poisonous products of their existence, become the means of injury to the peridental tissues.

Whenever a dead pulp, sealed up, and without external change of condition, becomes a cause of irritation, whether immediately after devitalization or indefinitely later,—following a period of quiescence—I infer that bacteria or spores have been brought to the apical foramen, in the blood or otherwise, and that to their agency is due the changes which have caused inflammation or suppuration. It is noticeable clinically that enervated conditions, or systemic debility favor the access of such inflammations, which frequently occur after long periods of immunity, notwithstanding the presence meanwhile of the dead pulp. But perceptible irritation is not always in these cases the beginning of injury; we notice this peculiarly, that pus is often already formed when the patient applies for relief, and that the common and best procedure,—drilling a vent,—yields a purulent discharge, although the inflammatory manifestations may have been present only a few hours. In this class of cases as well as those in which the dead pulp is exposed, chronic abcesses, with considerable destruction of tissue, may be formed at the apex of the root, without a perceptible inflammatory process, and the real condition perhaps be discovered only when acute symptoms lead to diagnosis and treatment; as if bacterial proliferation in such favorable condition were capable of producing suppuration without the phenomena of inflammation preceding, but coming after as a result of the extension or acceleration of the former process. These phenomena call to mind recent theories of suppuration, founded on extensive experimentation both in Europe and in this country, which seem to connect this destructive process essentially with micro-organisms, and thus make it allied to fermentation and putrefaction, and although the conclusion of the supporters of the theory that bacteria are the cause of every suppuration has not been generally accepted even by bacteriologists, yet the theory seems in a fair way of being established, for in this country it has been adopted by one of the foremost investigators as the result of his own experiments, and he defines suppuration to be "the splitting of living nitrogenous tissue into simpler compounds through the influence of certain bacteria." If the theory suggested to account for the cause of pericementitis, or suppuration is correct the long periods of immunity of the peridental tissues from such deleterious influences can be explained by comparison with the results of recent experiments on animals, which seems to prove beyond doubt that the blood and tissue cells in a normal state are able to prevent proliferation, and to destroy bacteria, but that when the systemic tone is lowered these micro-organisms may multiply in the living body; so the beginning of irritation can most reasonably be attributed to proliferation of organisms of putrefaction which gain access to the apical foramen only in conditions of certain systemic debility; before this time there may have been a period during which such bacteria could not survive in the blood. During the period of quiescence, however, there is another way in which putrefactive organisms may have access to the disorganized pulp; decay may advance through the tissues of the crown till an opening is made into the pulp cavity, or the dentist may make such an opening with his drill for purposes of treatment. The danger of severe and persistent pericementitis following such a procedure is becoming more generally recognized, but not so fully as it should be; and there is much diversity of opinion as to the best means of averting the danger among those who recognize it. In February, 1884, in a short paper on antiseptics read before the New York Odontological Society, the writer made the first recorded recognition, so far as he knows, of the risk attendant upon opening such a tooth, and gave the means of prevention—iodoform—which had been suggested by Dr. Bodecker as very successful in his experience. It is gratifying that the subject has received emphatic recognition in a work of so much importance as the "American System of Dentistry," but the explanation of cause and means of prevention, I should think inadequate. There are cases occurring constantly in which failure to appreciate the conditions and dangers is resulting in severe suffering; and there are many teeth in need of treatment that do not receive it because the dentist in charge is wisely afraid of the consequences of operating, not knowing the means of prevention. An inquirer in a recent periodical says: "I have two or three teeth now under observation which I would like to open into, if I only dared to do so." And in January last a professor in one of our colleges remarked to me, that he never opened such teeth if he could avoid it.

Dr. Louis Jack says, in the work just referred to, "that the condition causing such profound and serious disturbances is the presence of a morbific poison in the remains of the pulp, which may be "injected into the tissues," and that "the means of security is to be found in the use of disinfectants alone, and not as often is attempted by the applications of antiseptic substances;" that "no substance exerts so much power or is as convenient as permanganate of potash;" he recommends also for the same purpose peroxide of hydrogen,—overlooking the fact that both these substances are antiseptics,—and claims that by the careful method described in the text "disturbance may usually be avoided."

Dr. James Truman, in the same work, on the subject of dead pulps enclosed in unbroken walls, remarks, it is "oftentimes a question in the diagnosis of such a tooth whether the great risk warrants meddling with it at all," and if systemic conditions are unfavorable he advises "to allow the tooth to remain quiet, rather than risk the more serious evils of acute pericementitis, alveolar abcess, and possibly, in a depraved habit of body, necrosis." When opening such a tooth is however decided upon, he recommends applying before removal of the decomposed pulp, eucalyptus oil, permanganate of potash or iodoform; or again he advises cleansing and "syringing out the canal thoroughly with warm water, to which a small amount of listerine has been added," and "then take about the twentieth part of a grain of iodoform and moisten it with 20 per cent. solution of carbolic acid, carry this on a few fibres of cotton to the extremity of the canal and then seal up the crown with guttapercha, leaving a vent through the filling." This vent is made very emphatic in the text, on the theory of Dr. W. F. Litch, (Dental Cosmos, February, 1882.) that the irritation to be prevented, is in great measure due to the generation of sulphuretted hydrogen by the putrefactive process, and this must have a way of escape. Dr. Truman says that by these methods he "has had more satisfaction and far less anxiety in the management of these cases than at any former period." These illustrations serve to show that there is diversity of opinion as to the causes of disturbance and as to the best means of averting it, together with considerable doubt as to the results of operating in any case.

Since 1882 I have practiced the method suggested to me by Dr. Bodecker—since published by him—of making an opening, just giving access to the pulp cavity, and without the least effort to remove disorganized matter, introducing quickly some solution of iodoform in ether, or ether and alcohol, on a loose tent of cotton, and sealing immediately with guttapercha filling. After three or more days the root canals are cleansed and dressed with the same solution, and again sealed up, and a few days after this second application the filling of the roots may be accomplished. By following this method I have found such exemption from irritation of peridental tissues, that I may say there has not been a single failure; the few instances in which some pain followed opening the teeth, resulted in my opinion, from my undue confidence leading me to remove some of the pulp debris before making the antiseptic application; in these cases the pain subsided in an hour or two after it begun, and without treatment, or any subsequent unfavorable results. These latter incidents seem to me to be strong additional evidence of the power of iodoform to prevent the progress of putrefaction, and the pericemental irritation resulting, which is notably so difficult to arrest; for before the use of iodoform in these cases, I had almost never known this inflammation to yield to treatment satisfactorily; but with such results invariably following this preventive method, I have for a long time regarded the opening of such teeth as an operation attended with no risk. I do not hesitate to open any such tooth that needs treatment. I have already suggested an explanation, that in a dead pulp causing no irritation putrefaction has not occurred; but admission of the organisms of this process causes it to begin immediately, and the bacteria or poisonous products of their life, produce the irritation; and as they are also the organisms of suppuration, the latter is very difficult to prevent, when inflammation is commenced under such circumstances. Iodoform would seem to have the property of so changing the disorganized matter in the root that is not the favorable nidus it was, for putrefactive spores; and also of destroying those organisms that may have entered with the drill; but in proportion as the pulp debris is stirred up by efforts to remove it, before such sterilization, the organisms of putrefaction will be liable—almost certain—to get beyond the influence of an antiseptic applied the latter way at the same time with the cleansing process; may serve the purpose, but is not so safe a method I think, as to first render the soil unfit for development of the plants that cause the mischief. Iodoform fulfills the requirements, and does not produce any irritation in concentrated solution, which is not the case with other substances that approach it in antiseptic power. If disinfection or changing of a substance that is poisonous to an innocuous condition, were what we require, how shall we account for the fact that poison has been in the root for years and has not irritated the peridental tissues, but will do so within a few hours after admission of the atmosphere unless measures are employed to prevent it? Or if sulphuretted hydrogen is the cause of the disturbed nutrition we have to fear, how can we account for the fact that the vent which would be so necessary for its escape is shown to be unnecessary?

It seems to me, from what we know, that the most reasonable hypothesis is that the danger is due only to micro-organisms. Before their access to the soil so favorable to their propagation quiescence is maintained, but that their entrance to the root canal from either end results in putrefaction, and then in the inflammation whose origin has given rise to various theories, and whose progress is often so dificult to arrest.

With regard to root filling there is also considerable difference of opinion, as to the materials best suited for the purpose, and to a considerable extent also as to the idea that should control the operator in regard to the permanence of this part of his operation. Just now I believe that guttapercha is the most popular material for root fillings; the fact that it is so easily forced into the finest canals, and seems to fill all interstices so completely and with so little trouble or expenditure of time, has great influence with many, it would appear. But the great shrinkage of guttapercha, even when used solid, in perfectly accessible places, seems to be overlooked, and the fact,—that no doubt many have observed although I have not seen it noted,—that all root fillings of guttapercha smell offensively in every fiber, after having been in place a year or more. I say all, because I have had occasion to examine many, inserted by myself and others, and have always found them, and the dentine around them offensive, and preferred to remove them rather than stop in a bad odor.

If it be claimed that success in treatment warrants continuance of the practice, I can only reply that teeth often do well for an indefinite time with no root filling, or with one that is very far from being as complete a filling of the canals as could easily have been accomplished with a little more care; or with a cotton filling; but no one will for that reason defend leaving roots unfilled, or only half filled, when they might have been filled much more perfectly; and but few, I think, will defend cotton root fillings, for regular practice. The suggestion has been advanced also that a root filling should be of such a character that it can be removed without difficulty, when there is need to do so from recurrence of inflammation. This assumption that root fillings cannot be expected to maintain an aseptic condition of the canal, or that the pericementum is so liable to recurrence of inflammation from the abnormal condition existing, that one should by this be influenced in the use of a material, is I think a mistaken view, and is specially liable to influence the thoroughness of the operation. Expectation of ultimate failure must invite it, by keeping before the mind the chances of undoing the work. I would claim for root filling that it is one of the most certain operations in dentistry; and that when the root is in proper condition in ordinary cases, it should be filled with the best material that can be properly inserted for excluding everything else and maintaining an odorless and aseptic condition, and that choice of material should not be influenced by consideration of its removal. Guttapercha may be the best material for the purpose, but I cannot believe that with such shrinking properties, and such facility of absorbing gases or fluids, the tissues beyond the apical foramen may not eventually be debilitated by the gaseous emanations, so as to make them unable to resist bacterial proliferation; a thoroughly tight filling of cotton would be as good I should think for exclusion of organisms, and could not permit absorption to a more objectionable extent. I prefer to use guttapercha in roots only in those very minute extremities of canals that nothing else can penetrate so well,—considering it better than no filling,—and for stopping large foramina, because it is non-irritating and can be inserted with more accuracy than other materials; but for filling the greater part of such, and of all root canals, oxychloride of zinc seems to me preferable; its disinfecting qualities are desirable and seem to be continuous. I have never examined a root filling of this kind that had any odor, nor was the dentine malodorous,—it ranks high as an antiseptic also, and teeth whose roots are filled with it generally preserve their color better, and remain without any tendency to peridental irritation longer, so far as my observation goes, than when filled with either guttapercha or cotton. When it can be used I prefer tinfoil for occluding foramina, to prevent possible irritation of living tissues beyond by zinc chloride, and use guttapercha in the smallest quantity that will serve this purpose, only when tin cannot be employed satisfactorily. While I am willing to admit that systemic conditions do exist that prevent as full a measure of success in the treatment and filling of the roots of some teeth as we all deem desirable, I think the number of such cases is so few as to fully justify a general expectation of complete success, and the employment of materials and methods without any expectation of failure in view. Whenever doubt leads to less perfect methods, or less suitable materials, it must in a measure conduce to the failure it anticipates.

TEETH WITH DEAD PULPS, WITHOUT FISTULÆ, AND THE FILLING OF ROOTS.

Paper No. 2 of Symposium A.

BY DR. C. T. STOCKWELL, SPRINGFIELD, MASS.

[Read before the Dental Society of the State of New York, May, 1887.]

There were two prominent features of your Committee's invitation that induced me to undertake the part of No. 2 in this Symposium Paper. The first was the nature of the subject to be discussed. The second may be inferred from the following quotations: "The papers are to be short, terse and dogmatic,"—"No. 2 is to refute whatever he finds in No. 1 opposing his views, and give his own,"—"Dogmatic statements on the question are what we are after."

I shall endeavor to confine myself pretty closely to these specifications. By a somewhat hasty study of No. 1—necessarily hasty owing to the late date of its coming into my hands—I am pleased to find that there is little in it that I would, in any sense, attempt to "refute." Consequently my portion of this paper will be "short." From force of habit, if not also because of due regard to your committee's expressed wish, I shall, probably, be more "dogmatic" than is No. 1, who seems to me to be over wary of dogmatism in statement of premises as well as of conclusions, and, also, of logical methods of treatment.

Whoever the author may be he is, evidently, a man who habitually looks very carefully into all the minor details of any subject that demands his attention; magnifying too much, possibly, the relative or essential importance of such details; one who posts his sharpshooters along the entire line so as to sweep the whole possible range of the enemy's ranks; attempting to drive in the pickets before he dashes at the pivotal stronghold; being a shade too anxious about the stragglers whose base of supplies has been cut off, and who are thus reduced to a state of relative innocence.

My treatment of teeth with dead pulps, with, or without fistulæ, has, for some years past, been based upon the theory that, practically, we have to deal with a *singlè* agent,—the agent of sepsis. And since arriving at an understanding of the nature and habits of the enemy sufficiently to be able to train upon him the necessary guns from the antiseptic armory, the problem of dealing with, to say the least, the great majority of these cases has been reduced to one of great simplicity; and if results constitute a reliable test, little more is needed to demonstrate the truth of my theory.

If I understand the author of the preceding portion of this paper correctly, he is in substantial accord with the above statement as to causation. The following quotation would, at least, seem to warrant this conclusion: "Disorganization of the pulp tissue takes place after loss of vitality, but putrefaction cannot occur without access of the micro-organisms that promote this process."

Passing over, then the introductory portion of his paper, with which I have no material disagreement, I wish to notice briefly his statement regarding treatment of those cases where acute pericementitis has occurred as the result of putrescence. To simply "vent" is often sufficient, as is stated, to afford relief; but if a thorough elimination of debris can be accomplished, more sure and quicker results are, in my practice, obtained. Mere instrumental elimination is not enough. Nothing short of the solvent and mechanical action of H^2O^2 is sufficient; and this should be continued so long as application to the pulp canal results in its peculiar manifestations of action. He states further that: "When it—'acute pericementitis'—has passed the stage in which such a procedure gives relief, non-irritant antiseptics, as iodoform in solution, or creosote, or an anodyne, as wine of opium, applied in the root canal may be effective, and counter irritation applied to the gum is sometimes helpful, but these expedients are perhaps as likely to fail as to succeed." Here again, adhering to my premise, I should consider micro-organisms and the material favorable to their proliferation as the fact of first importance, and *in proportion to the thoroughness with which I succeed in eliminating both* lies my hope of an early, if not immediate relief. The use of creosote, in such cases, seems to me reprehensible in a high degree, entirely uncalled for and contra indicated by every condition present. Its coagulating and escharotic effect must certainly interpose a bar to the favorable action of remedies that are much more certain, at least, to result in the accomplishment of that which an enlightened apprehension of the real conditions would perceive to be the end desired. Instead of eliminating, its effect is to embed objectionable substances in a greater or less mass of coagulated matter, which, in time, may become favorable soil for further septic action, and which should give place to an indestructible and non-irritating material.

The use of iodoform seems far more reasonable than creosote, and comes much nearer meeting the requirements of the case; but even that, as the first step in the direction of relief, does not seem to be the right one. With iodoform—whatever its solvent be, provided it is nil or, at least, non-irritating—more or less time must elapse before favorable results can reasonably be expected. It must overcome the active septic condition that exists, in order to afford nature relief from the septic and pyogenic products against which she is contending. We may kill the organisms, and sterilize the putrescible matter, by the use of iodoform, and so, in time, smother the fire; but their carcasses and the entire mass of sterilized matter remain in the canals and tubuli of the tooth. These had vastly better be outside than inside. If a hot iron is placed in contact with the flesh, immediate removal is a more reasonable prescription than the application of cold water. The same result may be gained by either course, save only a deeper wound and a more extensive irritation by the slower process of remedial action. For the process of immediate removal of the iron, in such a case, is as essentially remedial as the after treatment of the irritation, be it constitutional or otherwise.

The application of wine of opium, counter irritation and the resort to constitutional treatment is, undoubtedly, often advisable; but this is of secondary importance as compared with the thorough elimination of micro-organisms and all putrescible matter. Until this result is secured, in a large measure at least, this line of action is premature.

A blind alveolar abscess that has become chronic—he again states, "is a condition that—I feel warranted by experience in saying—should be treated with distinguished consideration. Haste in permanently closing the aperture through which any abscess has had vent or drainage, is always attended with risk of unfavorable consequences; and in the case of alveola abscess, although immediate symptoms of irritation may not result, we are not on that account warranted in a proceeding to fill the root until we have a reasonable certainty that the abscess, as such, is destroyed, and the process of repair is begun."

My first criticism here is that the word "haste" needs defining. According to my own experience with blind abscesses we are "warranted in proceeding to fill the root" whenever we have secured certain conditions, whether a few minutes' or a few days' time is required to bring about these conditions; and when once obtained, we may proceed to "permanently close the aperture through which any abscess *has had* vent or drainage" at once.

The method is practically the same as in the treatment of acute cases. Attention is first directed to the elimination of putrescible matter and the destruction of the septic agents, believing them to be the direct antecedents of the troublesome condition; and that if they are removed nature is left free to proceed uninterruptedly with the process of repair. To refer to our hot iron metaphor again, I should say that when it is removed, if the effected part is absolutely protected from the floating matter of the air, no suppuration would occur unless the septic or pus forming agents reach the part through the *circulation*. But if suppuration is allowed to follow, antiseptic remedies are none the less in the direct line of treatment. When such wounds are best protected from the agents of suppuration, the best results are obtained. Nature goes to work along this line and proceeds to "permanently close" at the earliest possible moment.

The Doctor adds, further, that: "The cleansing of pyogenic tissues and the application directly to them—if that were possible in these cases—of antiseptic or other medicaments, would be of itself no assurance that suppuration will not continue, and would not therefore justify proceeding as if it had actually been arrested and the process of repair begun."

The results following my method of treating chronic abscesses seem to warrant a conclusion directly the opposite to this statement. I do not experience the trouble which is here apprehended. I wish to make this statement very emphatic. As the Doctor shows, later on in his paper, this fact is not so opposed to all scientific deductions as may have been supposed. The peroxide of hydrogen having eliminated the putrescible and purulent contents of the pulp canals and tubuli, not failing also to reach and "cleanse" the pyogenic tissues, and the root being filled with a non-irritant and powerful antiseptic material, the subsequent deposit, at the apex of the root, of amœboid cells or of inflammatory exudates would not, by any means, necessarily be the source of further inflammatory action, or of "offence to the surrounding tissues." If the injury that we are called upon to treat is solely due to "organisms or spores that have found entrance * * * to a condition so favorable to their proliferation," then it would seem reasonable to suppose that if they are eliminated or destroyed, nature will be found equal to the task of repair, readily organizing the amœboid cells into normal tissue. That is their mission in appearing upon the scene, and unless opposed by the presence and activities of bacteria they go quietly and harmlessly about their mission; offering no insult to, nor arousing the antagonism of, surrounding tissues. The inflammatory exudation will take care of itself if the pyogenic fungi are removed or excluded. If "the parallelism of fermentation, putrefaction and suppuration is established"—and in the light of recent investigations there would seem to be no escape from such a conclusion—the deduction is logical that the same agents that possess the power of preventing the progress of fermentation and putrefaction, have also the power to prevent the progress of suppuration. Prof. Black states that, according to these recent investigations, "the production of pus is not a vital act of the tissues from which it eminates, but an act of pyogenic fungi which take advantage of a definite form of opportunity."

From a long and almost daily use of hydrogen peroxide, bichloride of mercury, iodoform and eucalyptol, I am convinced that they are not simply antiseptic, to use the word as heretofore generally understood, but that they are also *antipyogenic*, if I may adopt such a term. By this expression I wish to convey the thought that these remedies not only destroy the organisms of fermentation and putrefaction, but that they also destroy the pyogenic fungi that are the direct antecedents of pus formation. However this may be it affords the best theory that I am able to advance to account for the facts of my almost daily experience with these cases.

No species of bacteria finds a comfortable or favorable soil for its proliferation within the range of the penetrating and persistent influence of eucalyptol and iodoform, especially when used in combination. And if the material used for root filling is composed, to any considerable extent, of iodoform, no one who is at all familiar with its action can conceive of its influence as being confined within the limits of the pulp canal. It extends to, and markedly influences the pyogenic tissues beyong the apical foramen.

If, however, the local or systemic conditions are such as to cause an apprehension of continued trouble, an artificial fistulæ may be established at once. Teeth with dead pulps, with a fistulæ, are cases that readily and promptly yield to the proper treatment. After treating hundreds of such teeth, by a method that was adopted some two years since, I am ready to "dogmatically" assert that a very large majority of such cases may as well be treated and permanently filled at a single sitting as after a week of sittings—provided, of course, that the sitting is sufficiently long to enable one to secure the desired result; viz., the perfect elimination of all such matter as a reliable preparation of peroxide of hydrogen is capable of acting upon. I know of no better test for this condition than the non-action of this remedy. In the treatment of bling abscess, as well as of abscesses with a fistulæ, after the condition is secured when no action is manifested upon the injection of H^2O^2 into the pulp canals, I am thoroughly convinced that nothing more or better can be done *at that point* other than to proceed, at once, to fill the root with a non-irritant and antiseptic material or combination of materials, one of which shall be iodoform, the powerful and almost ideal antiseptic. But, as previously stated, if there remains an apprehension of further trouble, it is an easy matter to establish a fistulæ for drainage or vent, and also in order to gain direct access to the pyogenic tissues through which medicaments may be administered. By the use of cocaine or pure carbolic acid, applied to the gum, an incision can be made to the bone with scarcely any pain to the patient; after which an opening to the apex of the root, by the use of a sharp drill, is easily accomplished. If this is done as the first step in the treatment of blind abscesses, the gases that result from the action of the H^2O^2 upon the contents of the cavity beyond the apical foramen —should there be one—will find ready escape, thus avoiding any pain consequent upon the pressure of such gases upon the surrounding tissue. The occasion, however, for forming a fistulæ in this manner, in my practice, I have found to be exceedingly rare.

The Doctor refers, further on, to several instances of more or less acute inflammation following the use of peroxide of hydrogen in his efforts to cleanse blind abscesses.

I have used it with great freedom for several years with not a single instance of such a result. In the cases he cites I am, very naturally, more or less skeptical about H^2O^2 being the responsible agent. However this may be I should consider that acute inflammation, resulting from the use of a reliable preparation of H^2O^2, would be about as exceptional as the phenomenon of poisoning by strawberries. In regard to his reference to special or exceptional cases, or cases presenting extreme features, I shall attempt no criticism on account of the otherwise necessary length of this paper, preferring to confine myself to general principles, knowing full well that there are exceptions to all rules that can be successfully dealt with only by an intelligent apprehension of special conditions, and an intelligent application of various means of meeting and overcoming such conditions.

With these few references to portions of this most excellent paper, I will proceed to lay myself open to your criticisms—which opportunity I have little doubt will be well improved—by stating, in as brief a manner as possible, my own method of general treatment of "teeth with dead pulps," with and "without a fistulæ." And as this method was given more than a year ago, at the annual meeting of the Vermont State Dental Society, I will give the statement, substantially, as given on that occasion, with the simple remark that it is a method I have practiced, almost exclusively, for two years past with entire satisfaction. In fact I may assert that in no single instance have I had any knowledge of any other than favorable results.

Without going into minute details it is simply this: Open well into the pulp chamber; adjust the rubber dam, or not, as circumstances may suggest; remove all debris as thoroughly as may be; after doing this inject H^2O^2 into the canals; wait a few moments and note the bubbling that is pretty sure to follow; wipe out the cavity with absorbent cotton and again inject more H^2O^2; *repeat the application of* H^2O^2 *thus until it ceases to manifest any action whatever.* If a fistulæ exists, or if it is deemed advisable to establish one as the first step in treatment, all possible effort should be made to force the remedy through the apical foramen, getting its manifest action upon the pyogenic tissues at the fistulous opening. If it cannot be carried through the root to this tissue, the injection may be directed through the fistulæ. The next step is to dry the cavity as thoroughly as absorbent cotton will render it, and immediately saturate the canals with fresh bi-chloride of mercury—$\frac{1}{1000}$ strength. After the bi-chloride of mercury has remained in the cavity for a few moments I remove the surplus and thoroughly bathe it with Sander & Sons extract of eucalyptol, making that the vehicle for a considerable quantity of iodoform. Eucalyptus oil is, perhaps, equally good, although I have not tried it. I then warm fine, delicate points of base plate gutta percha, and dip them into a solution of iodoform and eucalyptol and carry them into the canals, filling the apex thoroughly. I usually fill the canals and pulp chamber entire in this manner; but in the more suspicious cases I frequently vary the treatment as follows: First, fill the root canals, or the upper portion of them, as above, with gutta percha dipped into the solution of iodoform and eucalyptol; then fill the balance of the canals and the pulp chamber with cotton, moistened slightly with eucalyptol and loaded as heavily as possible with iodoform, sealing this combination in the pulp chamber with gutta percha. The crown cavity may be filled with such material as conditions indicate as regards permanency, etc. This, stated as concisely as I am able to do it, is my present method of treating practically all cases of "dead" teeth. Besides the advantage of being able to treat and fill nearly all such cases at a single sitting, the results are apparently better than by any other method I had previously adopted. As stated heretofore I have yet to meet a single case where anything but satisfactory results have followed.

Please note two things especially. First, the extract of eucalyptol is the manufacture of Sander & Sons, Australia. With no other preparation have I had any success whatever. The ordinary preparations will be as variable as the stores at which you get them, and none of them can be said to be extract of eucalyptol in fact. This, at least, has been my experience. Second. Note the fact that no carbolic acid is used in any part of the operation.

I do not claim, by any means, that carbolic acid has no place in a dental office. Neither do I claim that good results may not be gained by its use in the treatment of pulpless teeth. What I wish to be understood as claiming is, that better results may be secured by other means, and, more especially, that it should never be used in connection with the other remedies named and embraced in my method of treating these cases. If carbolic acid is used before the application of the hydrogen peroxide, bi-chloride of mercury, eucalyptol or iodoform, it would largely, if not entirely, destroy their good effects by its coagulating influence: thus practically sealing the entrance to the all important tubuli of the dentine. The penetrating effect of the strong antiseptic remedies used would thus be cut off, and the permanency of the operation greatly endangered. The pulp canals would, for a time, be rendered aseptic, but the entire body of the tooth, especially of the dentine, would remain septic, or subject to septic action. Carbolic acid is not a penetrating agent, and is only temporary in its effect.

The author of the previous paper objects to the use of gutta percha as a root filling, owing to its liability to "great shrinkage, even where used solid, in perfectly accessible places," * * * and also because "all root fillings of gutta percha smell offensively in every fiber, after having been in place a year or more."

In regard to the matter of its liability to shrinkage, I had supposed that it is generally considered that quite the reverse is true, especially "when used solid." All my experience with it—and I use it largely for various purposes—convinces me that it possesses the quality of expanding slightly rather than otherwise. In regard to its smelling offensively when used as a root filling, all that I can say is that I have not noticed it, for I never had an occasion to remove one.

He also says: "Teeth often do well for an indefinite time with no root filling." If this statement can be admitted to be true, in any sense, it is by no means the rule. The word "often" certainly needs to be qualified, if not, also, the words "do well."

Oxychloride of zinc undoubtedly makes an excellent root filling, in many cases at least; especially when the conditions of the pyogenic tissues are such as to admit of its use. I used it, almost exclusively, previous to the adoption of my present method. That oxychloride of zinc *per se*, however, possesses "continuous disinfecting qualities" is extremely doubtful. The zinc chloride possesses active antiseptic qualities; but when it has once formed a chemical union with the oxide, in my judgment, it is as inert as a quartz crystal. The objection to its use, as a root filling, is its irritating action upon the tissues beyond the apex of the root; and also because it does not possess that powerful antiseptic property that is found with iodoform. Were I obliged to again resort to its use I should experience all the "sense of dread" of former years when these cases demanded attention, and should feel compelled to undertake almost identically the same long, tedious course of treatment that the Doctor has so well indicated in the foregoing paper.

I had intended to subjoin a few of the many letters that I have received of late that indicate, in the strongest possible terms, the successful adoption of this method by others than myself. But my paper is already so long that I will only quote briefly from two writers, both of whom adopted it a year or more since. One writes relating a most extreme case, and closes by stating: "I might give other cases, but it is sufficient to say that I have yet to record my first failure with this method when no other remedies had been used."

Another writes: "Of sixty-two cases which I have treated in this way, the past year, the only failures—that is where the fistulæ had not healed within three weeks after the operation—were two old chronic cases; one a superior incisor of eight years standing, the other, a first inferior molar of over six years standing." I should state that the author of the last statement usually establishes a fistulæ in those cases where none already exists. Also that many of the cases reported were those where the surrounding tissues were much swollen and inflamed, with pus also abundant, when the operation was commenced. I should hardly dare to record the detailed statements, regarding some of these cases, as given and now in my possession. The statement is made, however, that in a majority of these cases the treatment and fillings were completed at one sitting. In scarcely any instance has treatment extended beyond two sittings.

It is hardly necessary for me to add that these results are gained, in my judgment, as the result of, first, the *cleansing* action of H^2O^2 and, secondly, the powerful and persistent *antiseptic* properties of the materials used as a root filling. Were I to secure the same conditions as at present with H^2O^2, and then to at once proceed to fill the root with chloro-percha, oxychloride of zinc or other non-antiseptic materials, I should not expect the same favorable results, especially in the treatment of abscesses without fistulæ.

TEETH WITH DEAD PULPS, WITHOUT FISTULÆ, AND THE FILLING OF ROOTS.

Paper No. 3 of Symposium A.

BY F. Y. CLARK, M. D., D. D. S., NEW YORK.

[Read before the Dental Society of the State of New York, May, 1887.]

"Short, terse and dogmatic," such says your committee, are the requirements of these symposiums.

In carefully reviewing paper No. 1, we are forced to the conviction that the reverse of the text has been observed. This paper is neither short, terse, nor in the least dogmatic. The writer has introduced nearly the whole list of antiseptics, with almost every mode of practice in vogue, and said just enough in favor of each to leave one in doubt as to the best. In short he has most *undogmatically* and prosily hedged, so that it is almost imposseble to get at him. Not satisfied by strengthening his castle by almost every species of practice known, making it apparently impregnable, he calls Drs. Jack, Truman, Bodecker, and the "*American System of Dentistry*" to his aid. No wonder symposium No. 2 stands aghast exclaiming, "there is little I will attempt to refute;" almost surrendering before an attack, and after a heroic fight and gaining a few strong positions in order to hold them, threatens to deluge the auxiliaries of his antagonist by bringing forward a flood of testimonials.

This contest reminds us of a time, many years ago, when we with two larger boys went berrying. The old field was two miles away, and the boys had two hours the start. When we arrived they had full buckets, and said they had been all over the field, were very sorry, but there were no more to be had. Looking into their buckets we saw that they had picked all sorts: green, ripe, large and little. This, along with their hands and feet (which did'nt look scratched) gave us some encouragement, so we stole away under the briar bushes in the hidden and byways, and astonished our chums by filling our pail with large, ripe berries.

Now the pulpless field before us is very much like that old berry field; it has been gleaned, even microscopicly, by two big strong boys, and apparently there is little left; but possibly amongst the under-brush, in byways and hidden places, we may find some good fruit.

We need hardly say how pleased we are to see that our predecessors have espoused the germ-theory of treatment. This is an advanced step in the treatment of pulpless teeth, and truly wonderful, when only a few years ago the writer of this paper was denounced for the introduction of this theory before the Odontological Society of this city; and a little before this, when he read a paper before another society of this country on bacteria, the meaning of the word was hardly known.

We have no idea of who the author of No. 2 is. We thought we knew all the germ-theory men who could write as intelligently on this subject, but after careful thought we confess to no more knowledge of his identity than of No. 1. They both start by promising to be very dogmatic, but fail in this, most outrageously. No. 2 clearly detects this failure and says: "I will probably be more dogmatic than No. 1, who seems to me to be over wary of dogmatism in statements of premises as well as of conclusions, and also of logical methods of treatment." In this respect, though promising fair, he has done little better than his predecessor; has fallen short of his promise, and far short of what symposium—according to the definition of the committee conveys.

Now we can't agree at all with No. 2 in saying there is little in the preceeding paper which he would in any sense attempt to refute. If he means there is nothing in it worth refuting, then he is nearly right. For as said before, the paper instead of being terse and dogmatic is prosey and exceedingly conservative. The hedging care with which it is written, advocating almost every mode of practice known, without positively condemning or approving any, is perhaps its weakest feature.

Evidently the writer, as No. 2 says, is a very cautious man, and knows more than this paper would lead one to believe. Was it not for his caution, and perhaps dread of No. 2 and 3, we would have had a less strategic, but an abler production.

He says, "The greatest possible care is desirable, in all efforts to enlarge canals, to avoid passing *a drill* through the root at any other point than its apex." What a practice! Is it possible that he ever finds this necessary in any case? A hair broach will do the work, and leave no ragged or sharp edges to irritate surrounding tissues. How is it possible to fill the root so as to have the apex rounded and smooth after drilling through as proposed? It is impossible, impractical, and in no case necessary, therefore should be condemned. It is hardly, if ever necessary to pass any instrument larger than a hair broach through the foramen. This will unchoke the natural opening and admit the free passage of any anæsthetic used, which is all that is desired.

Again he says—when speaking of acute pericementitis—"When it has passed the stage when mechanical treatment fails to give relief, then non-irritant antiseptics, as iodoform in solution, or creasote, or an anodyne, as the wine of opium, applied to the root canal, may be effective; and coutner-irritants applied to the gum is sometimes helpful." Then as if having little faith in all this, recommends constitutional treatment, but don't say what the treatment should be; and again, as if feeling rather doubtful as to this treatment, brings once more to his aid the *American System of Dentistry*, by saying: "The recognition that has been given to the efficiency of systematic treatment in the new American System of Dentistry is, I think, a gratifying evidence of progress. Now all this is too indefinite, and teaches nothing. More pens and paper have been destroyed in bolstering up these species of treatment than the whole thing is worth. Had No. 1 reflected more, and hedged less, he would have seen that creasote does not work in harmony with iodoform or wine of opium. The first as No. 2 says, is an escharotic, while the others are anodynes. The first will burn where the second will soothe, and should never be used when and where the last is called for.

Again he says: "We are not warranted in proceeding to fill the root untill we have a reasonable certainty that the abscess, as such, is destroyed and the process of repair begun." What is the certainty? It seems to us he ought to have given us some kind of a guide to the haven of security. If he had said: Never fill as long as you can detect the least odor on the instrument used in the root, or in any way see or detect the least discharge, (which are the only reliable criterions, so far as we know) then he would have been more instructive.

Farther on he gets into a tremendous tussle with a so-called blind abscess, in which—according to his own statements—we are inclined to think he is to blame. Meeting with usual success with tereben, he tries it on a lower bicuspid, and for thirty-six hours has a lively time; and again has several similar results in the use of peroxide of hydrogen. Blind abscess is too indefinite. If we only knew the real condition of these teeeth in which these failures occurred, the nature of the discharge or the septic factor to be fought, then, no doubt the trouble would never have occurred. *Either the antiseptic was too active—perhaps forced above the apex, and, owing to the peculiar and exceptional conditions of the tisues, acted too energetically, thus becoming an irritant—or the canal or foramen was choked, or air carelessly, as is often the case, forced through the root. All these little things we are extremely apt to overlook, and attribute the sin to the antiseptic.*

The Doctor seems to have a holy horror of opening up pulpless teeth, and quotes a number of names high in authority, not forgetting the *American System of Dentistry*, to prove it a very dangerous thing to do, and then says after adopting the system of making a minute opening and using iodoform he has not had a single failure. Here he has given the iodoform by far too much credit. The success is more due to his being unable to force septic matter through the foramen, owing to the minute hole mentioned. He will find that peroxide of hydrogen diluted one-half with water, or any similar anti septic, will with the same care act equally well. We were not aware —before the aaray of testimony the Dr. has brought to bear—that this condition of pulp was considered so dangerous, and from our own practice and experience are inclined to think the extra danger is in carelessly opening, probing or choking.

We believe the bleaching of pulpless or discolored teeth is not included in these papers, but it seems to be a part as much as root filling. In connection with this we will only say it may not be generally known that peroxide of hydrogen is the great bleaching liquid that barbers have been using for several years to produce blond and white heads. Some time ago this led us to try it in bleaching teeth and we are ready to say it far exceeds our expectations and does more than anything we have ever tried. Along with this its disinfectant properties make it doubly valuable.

We would like to devote a little time to symposium No. 2, but as we have given his predecessor more time than intended, we will have to let him go with one or two raps.

He says, "The use of creasote in such cases seems to me reprehensible in a high degree and entirely uncalled for, and contra-indicated." This is partly wrong. Remember, as stated, creasote and carbolic acid are escharotics, and that there are a few case in which nothing will do the work like a good escharotic. This is proven in necrosisis of the alveolus. And again no antiseptic in the whole list will retain its power as long as carbolic acid or creasote, and when it is desirable to bring about healthy action by granulation there is nothing like them

In another part of this symposium he says, "I am ready to dogmatically assert that a very large majority of such cases may as well be treated and permanently filled at a single sitting as a week of sittings." Great goodness! Is it possible he or anyone has been in the practice of giving more than a single sitting in these cases? Certainly we have not, (not account of treatment) for the last thirty-five years. Here is where creasote comes in as nothing else will. Force it through until it shows freely on the outside of the fistulæ, and then fill, and that is the end of the case so far as any future trouble goes.

In all cases of fistulæ where there are pus pockets and disorganized tissues, we want an escharotic. The peroxide of hydrogen will readily and most effectually dispose of all pus; but the parts frequently need the stimulating influence of creasote.

Again this fellow says that carbolic acid should never be used in connection with other antiseptics named in his paper. Now this, to say the least, is very rash and *a little dogmatic.* If he had said it should never be used strong enough with others to act as an escharotic, then we would not dispute, but when we know there are certain cases that cannot be controled by iodoform, tereben, or peroxide of hydrogen alone, which will yield pleasantly when 2 per cent. carbolic acid is added, particularly to peroxide of hydrogen, then we must be equally if not more dogmatic and say he is wrong, that we don't believe he ever gave the thing a fair trial.

The only way to understand the true specific treatment of the various abnormal conditions of pulpless teeth is to begin at the bottom or origin of the trouble and go up. Let us see if we can work this rule out in the following cases:

No. 1 is a case of an almost odorless discharge of thin pus. There never was any trouble with the tooth. The decay gradually encroached on the pulp, and a quite peaceful death followed. In this case it will be readily seen there never was an abscess. Therefore we have to deal with a simple case of disorganized tissue. Now reflect a few minutes and you will see that the life forces are trying to free themselves of an attacking enemy, that they are throwing off septic matter as fast as manufactured. To assist these life forces in the struggle we must become familiar with the enemy,—his weapons and mode of using them, and to do this must get into his armory and amongst his private weapons.

If you are a good bacteriologist and will patiently examine the pus or discharge, after a while you will know the enemy and know how to meet him with a certainty of success. We would like to go into this, our pet subject, but, according to the text, space and time will not permit. Suffice it is to dogmatically assert, *for every condition of disorganized pulp a fermentive organism is the factor to be dealt with*, and familiarity with the life, history, behavior and office of this organism is the only sure way to arrive at intelligent and effective treatment. To illustrate; say we are in doubt in the case under consideration. A trace of the pus or discharge is put on a slide under a good one-eighth or one-tenth objective, with a B or a C occular, and then a trace of iodoform, peroxide of hydrogen, or any similar disinfectant. If there is true antiseptic action there will appear a slight disturbance, approaching effervescence, just enough to be noticed, followed by deliquescence. If this is not apparent the antiseptic should not be used. Perhaps this can be better understood by placing a grain or two of animal or vegetable matter in half a glass of water. In a few hours quite a little commotion at the bottom and sides of the glass will be apparent, and when first fermentation has taken place and the fluid is a little cloudy, examine the water, and micrococci and a few other species of bacteria will be seen. This, for convenience and in order to be better understood, we call First Ferment. Now put a few drops of peroxide of hydrogen in the water, and in a few minutes it will become clear and the organisms will be precipitated to the bottom in a dormant and lifeless state, according to the strength and quantity of the antiseptic. But let the water alone ten or twelve hours longer, leaving out the H^2O^2, and a deeper cloud will appear, and other organisms will be seen, such as bacili vibrigs, and perhaps spirochate. The H^2O^2 will now have little or no action, but iodoform or bi-chloride of mercury will cause the water in a little while to become free of organic life. Again allow the water to stand for ten to twenty hours longer and it will swarm with bacteria-termo, the true organism of putrefaction. Drop into this carbolic acid, 1 to 100, and H^2O^2 1 to 200, or iodoform, and organic action will cease. The peroxide of hydrogen don't seem to act the same on bacteria-termo as when mixed with carbolic acid, nor does the last on micrococci as well as the first. Now does this not point to a path that will lead to the correct treatment in the different conditions of pulpless teeth under consideration? We would like to follow this further, but the text,—short, terse and dogmatic—bids us on. It will be readily seen from what has been said as to the case under consideration that H^2O^2 is the true antiseptic called for. Before using this the decay and debris in the crown should be somewhat removed, but *under no pretext or consideration* attempt to barb out the root until the tooth is disinfected. Remember by inserting a nerve barb you dislodge debris and choke up the foramen, which is sure to give trouble before you get the case safe in hand. And even if you do not choke, forcing an instrument above the apex before disinfecting is equally bad, and like poking a stick into a hornet's nest to see if they are at home. Then let us repeat, under no consideration *fool with the case until you disinfect, or until it has been under treatment at least twenty-four hours.* The root may then be washed out; and if there is no odor on the barb, or sign of discharge, fill. It is always better before filling the root to clean it out with about one-tenth of a drop of creasote. We can imagine no case, unless one of fistulæ, where creasote or carbolic acid should be used at first. As said by No. 2, it is an escharotic, and should never be used at first unless in the case referred to; but when all trouble is well under control, there is nothing better or as good. One-twentieth of a drop, or a trace, introduced into the root before filling will remain and act as a faithful sentinel for many years. By far the best way to place this sentinel on guard, and to fill roots, is to mix about one drop of creasote with oxy-phosphate cement, and when quite soft press well into the root. The surplus when hard can be cut away. This, for many reasons, is the best and most convenient method of filling roots that we have ever tried, and we most unhesitatingly and dogmatically recommend it in preference to all others.

Case No. 2 is entirely different from No. 1, and requires different treatment. There has at some period been considerable pain, and perhaps a little engorgement of surrounding tissues, which passed away, and the tooth has been and is now quiet and in a dormant state. The pus is thick, with a yellowish tint; and on tapping the tooth it seems a little more sensitive than the adjacent ones. At the end of this tooth there is most undoubtedly a chronic or secretory sac, which has to be broken up before much headway can be made towards successful treatment. At the second sitting a fine hair broach should be passed through the foramen and followed by a drop or two of peroxide of hydrogen, and at the next sitting by a drop of creasote, and then filled.

Case No. 3 is a mumified condition of the pulp. It is dead, but there is no apparent discharge or odor. You do not want to fool about this case much with instruments, and particularly peroxide of hydrogen; air it don't want too rapidly. Just use a trace of iodoform and seal it up for a few days. At the second sitting a good washing out and renewing the iodoform is about as much as the most of these cases will bear. If it stands this peacefully it is under control, and can be treated in the ordinary way. There are several conditions of this last class that require special treatment. Occasionally there is just a little life left; no bleeding, and nothing to be seen; but the instrument will produce considerable pain, sometimes followed by an after pain. This pulp, from all indications, should be dead as a door nail; but on the contrary there seems some kind of life connection. In this condition of pulp, tincture cannabis indica has a wonderful effect and appears to succeed when all other obtunders fail.

Case No. 4 is one that symposium No. 1 devotes so much attention to under the head of blind abscess. This is a misnomer. Such cases generally come within the scope of a class that has been filled, where the pulp slowly died, owing to the proximity of the filling, or from some destructive agent used before filling, or unknown cause. Now before this condition of pulp can be satisfactorily and intelligently treated we must first learn what sceptic we have to contend with; and, as said before, this can only be accomplished by patient microscopical research. Examine the pus carefully, see how it differs, if at all, from the discharge in other cases, and by experiment learn what antiseptic should be used. Remember that nine times in ten there is a disorganized condition at the apex of the root, if not a gas or pus pocket. When the condition of the tissues are in such an abnormal state as not to tolerate air we should not use any antiseptic at first, washing out with some simple anodyne, leaving a little in, taking great care none is forced through the forament, for *it is generally the air or liquid which is carelessly forced against the parts beyond the end of the root that produces the trouble.* Consider this well and you will avoid it and have better success.

ALVEOLAR ABSCESS: ITS CAUSE AND TREATMENT.

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A professional man's life may be likened to a graded school in which each study is introductory to one more complex in its nature ; and may I not hope that my essay will prove at least initiatory of larger knowledge for some in their search for light in regard to one of the most perplexing diseases to which the oral cavity is heir ?

There is no subject on which there is greater demand for knowledge than that of alveolar abscess. This trouble is met with in almost every month, and it is the recurring duty of *every* dental practitioner to treat it.

Let us first consider the *nature and stages of the disease.* An abscess is a circumscribed collection of pus, due to some disturbing element. There are two forms of alveolar abscess, viz., the *acute* and the *chronic.* The *acute* form occurs in rapid healthy inflammation, and the usual inflammatory symptoms are: *first*, redness, due to increased blood in the part; *second*, swelling, due to the exudation, with a tendency to point; *third*, heat, due to textural changes (or tissue breakdown,) which can usually be recognized by touch; *fourth*, pain, varying in degree according to the resistance of the tissue and nerve-supply,—and this pain may be acute, throbbing, or dull, lasting for a few hours or for days; may be referred to the part affected, or reflected to the whole side of the head.

If an acute abscess be left to take its course, it usually breaks through the cheek or into the mouth at the most dependent point, or it may be absorbed, and disappear through the circulation. Unless the exciting cause is thrown off as above indicated, the abscess will run into the chronic form. Or, it may subside for awhile, when a cheesy deposit is formed about the source of the trouble, which, under favorable influences, may light up afresh at any time as before into an acute abscess, the requisite exciting cause being nothing more severe than a sudden shock to the tooth, chilling of the face, wet feet, etc.

Chronic abscess may be the consequence of repeated attacks of the acute form, or the involvement of an increase in area of a morbid process. It is the chronic form of abscess which usually comes under our observation as dentists. It is usually readily recognized by a fistulous opening through the alveolus and gum, and discharges into the oral cavity. But a chronic abscess may exist without an external opening, the pus burrowing through into the antrum, or it may be absorbed and taken up (as before) by the circulation. In the latter case it can usually be detected from the appearance of the tooth and surrounding tissues, or from the odor of the breath It can be readily diagnosed by the aid of the electric lamp. A chronic abscess being one of long standing, differs from the acute in the absence of all apparent inflammatory symptoms. Pain may be present or not, depending largely upon the extent of absorption or necrosed bone. In scrofulous persons the tendency for tissue change (or breakdown) is increased, while in the non-scrofulous an abscess of long standing may have caused slight destruction to the surrounding tissue. There may be a feeling of discomfort or tenderness, or nothing whereby the patient can detect its presence. Chronic abscess usually occurs in the young and the middle-aged, but the acute form may occur at any age. Acute abscess may occur in old age, but it is very rare, owing to the diminution of the pulp and the formation of secondary dentine. When chronic abscess is founed in old age, necrosed bone is usually present.

The most common *causes of alveolar abscess* may be mentioned in the order of their frequency, and divided into three classes—namely, *external, indirect, and direct.*

The *external* causes are those of mechanical nature, in which a foreign substance is present—as, *first*, the rough surfaces of fillings, and where the filling-material is forced down and left beneath the margin of the gum; *second*, where there are "self-cleansing" or V-shaped spaces between the teeth, thus allowing food to be crowded or lodged around their necks; *third*, where the roots have been punctured and the cementum wounded; *fourth*, where broaches have penetrated the apical foramen; *fifth*, stomatitis, or ptyalism of the ulcerated form.

The *indirect* causes are those which produce the death of the pulp —as, *first*, arsenic and chloride of zinc, used as an obtunder of sensitive dentine, or to devitalize the pulp; *second*, metallic fillings in contact with highly sensitive dentine,—and I include under this head cement fillings; *third*, the covering of an exposed pulp with a thick gutta-percha cap, and the placing over it of a non-yielding permanent filling; *fourth*, traumatic causes, as from a blow, or the twisting of a tooth into position by the use of forceps.

The *direct* cause is that which gives rise to the inflammatory stage, and may result from septic matter being carried through the apical foramen of a tooth, either from the use of instruments or the formation of gas within the root-canal. This latter is the most prolific cause; and the gas may be formed from the following elements: *first*, from decomposed nerve-tissue remaining in the root; *second*, from cotton when used as a filling-material; *third*, from cement when used as a filling-material. The cotton and cement collect the poisonous vapor arising from the animal matter left in the dentine of the root, until it becomes overloaded, which is then forced out through the foramen or canaliculi, thus becoming the exciting cause of an abscess. These substances may therefore be pronounced as bad filling-materials.

Of the *external* causes of alveolar abscess, we may mention those which result from slovenly or injudicious operations in filling, from self-cleansing spaces, and from salivation, the two last mentioned being perhaps the most necessary for us to notice. For the sake of brevity we will consider these three causes together.

That known as the "radical" treatment should be resorted to in these cases. Remove the cause; then, with sharp scalers and burs, carefully scrape and cut away all traces of hypertrophied tissue (or fungus growth) and roughened surface of bone. Follow this with astringent washes, and the use of aromatic sulphuric acid, which may be carried to the diseased bone with the hypodermic syringe (first smearing the surrounding gum with glycerine to prevent excoriation.) Care should be taken not to use the acid beyond the extent that is necessary to accomplish the object. Its office is to dissolve out the dead bone and stimulate to healthy granulation.

When the trouble arises from the use of mercury, the best results may be obtained from general treatment. Iodide of potassium clears up the mercurialization. This treatment should be resorted to persistently, and the care of the general health of the patient should not be overlooked.

In considering *indirect* causes and *preventive treatment*, it is necessary, first, to understand the delicate nature of the organ we are to treat; and, secondly, to have a knowledge of the character of the material employed. No irritating substance should come in contact with the sensitive dentine. If a cavity is first lined with a non-conducting material—say a few layers of tin-foil—or filled with gutta-percha for a few weeks, or perhaps months, it will be found that such practice will, to a great extent, prevent the death of the pulp from thermal changes.

For arsenic and chloride of zinc, we have no use in connection with living pulp-tissue, for we never know how far their influence is to extend. They are things of the past, and we must "let bygones be bygones."

Let us now consider the *treatment of the acute form* or of an incipient abscess—the *abortive treatment.* Slight soreness of the affected organ may be the first intimation of trouble, the soft tissue around the tooth is found inflamed when a scarification of the gum, or a leach applied over the affected part, should be resorted to at once; also counter irritation, such as tincture of aconite and iodine, capsicum plasters, fluid extract of Jamaica dogwood, etc. There may also be applied to the gums or over the cheek a cold compress, in order to retard the inflammation and fever, and it will generally be found that this will mitigate the suffering and modify the character and course of the disease. But when the tissues break down and suppuration intervenes, we must look for the formation of pus, and when formed freely lance and evacuate the contents. After this, again apply the cold compress in order to reduce the swelling, and prescribe for your patient a mild purge, accompanied with an opiate to relieve the pain. Usually the case will go on to a successful termination, although it sometimes runs into the chronic form. (I will remark in passing that a diseased tooth may remain in a quiescent state for years, and suddenly, on very slight provocation, develop an angry abscess of the class we have just been considering.)

The *radical treatment* from *direct causes* may now demand our attention. We must first open directly into the tooth on a line with the pulp canal, in order to allow the escape of the pent-up gas, and to afford an opportunity for removing any decomposed or foreign substance. It is important that the tooth be so opened that the operator may have little or no difficulty in obtaining access to the very end of the root with a drill, and in a large proportion of cases—say 90 per cent.—this can be accomplished by the use of the Morey flexible drills, which I find admirably adapted to this purpose. Considerable of the dentine should be removed, and the apical foramen approached as closely as possible without puncturing the root, or forcing through any of the poisonous matter. It will often be found impracticable to drill up to the very end of the root, owing to the crookedness of the fang; and here a delicate flexible explorer can be employed to great advantage, and an opening forced to the distance required. Care should be observed not to allow the ingress of saliva at any time during the course of treatment. Carbolic acid, full strength, with an eighth to a quarter of a grain of the sulph. of morphine should now be employed. A portion should be carefully worked up into the canal, and the cavity carefully sealed. This treatment should be repeated every second or third day, until all traces of odor have disappeared—usually in about a week's time. After the first or second dressing, a rope of cotton, saturated with the acid and morphine, loosely packed into the canal, will often be found to work to advantage.

The *canal* is now ready for *filling*. I prefer the following method: With extreme care fit a piece of orange wood so that, by slightly tapping it can be driven to within the one-thirty-second of an inch of the end of the root. First measuring the length of the root, and marking the result on the plug, then carry it up until the mark on the stick indicates that you have reached the end. Now withdraw the plug, and with a sharp knife delicately cut a ring around it one-sixteenth of an inch from the end. Carbolate it and again carry it up into place; then, by slightly twisting, you can break this end off, leaving the apex of the root sealed. Now place in the cavity a few drops of chloroform, and into it carry up a gutta-percha point (specially prepared for filling root canals), which soon dissolves, and with a pumping motion you can fill all the open canaliculi, thus preventing any possibility of gas arising from decomposition. Roots thus filled should be allowed to remain several days before a permanent filling is inserted. This is to allow an opportunity for the expansion or contraction of the gutta-percha. This, however, would greatly depend upon the amount of material used.

The foregoing is my treatment for every pulpless tooth, whether *abscessed* or *not*, except in those few remote cases where we cannot carry the orange-wood plug to the end of the root, and where the foramen is open sufficiently to allow the passage of fluid, when I pump the solution of gutta-percha to the very end of the canal. Filling such roots with cement intermixed with iodoform is, I think, worthy of a trial. In the *treatment of the abscess*, if there is a fistulous opening through the gum, take a delicate probe (the lachrymal probe made of silver and used by ophthalmic surgeons, is the one best adapted to the work), and ascertain the direction of the passage to the abscess, and which root or roots may be involved; also, determine the amount of the destruction of bone tissue and outline of excavation. When the abscess has only burrowed its way through the alveolus, and the surrounding soft tissues look healthy, usually all that is necessary is to firmly secure a small piece of cotton on a heavier probe, saturated with carbolic acid, and carry it up into the abscess, smearing its interior walls. It may be necessary to repeat this treatment a few days later, but as a rule this is sufficient, and resolution soon takes place. But where there is much destruction of the process, the *radical treatment* should be adopted. This consists of selecting a clean, sharp bur of suitable size, passing it up through the fistula, and carefully cutting away all the sac of the abscess, dead bone, or rough surfaces, and injecting into the cavity a solution of aromatic sulphuric acid, which dissolves out all the pieces remaining, and stimulates the parts to heal. This operation being rather painful, a mild anæsthetic, such as nitrous-oxide gas, may be employed; or, as is my custom, the cavity may be injected with a strong solution of the muriate of cocaine.

The process of healing is by granulation. Loops of blood-vessels are thrown out, with the formation of epithiloid and giant cells, and then the process of tissue reproduction has begun, and is continued until restoration is complete. Progress depends largely upon the idiosyncracy and the general health of the patient. In some cases it is advantageous, two or three times during the first ten days, to wash out the wound with the stimulating solution, such as a weak preparation of bichloride of mercury, sulphate or chloride of zinc, and apply on the gums over the wound, a counter-irritant, such as tincture iodine and aconite, equal parts, this, however, best used in the early stage. Pus may exude a few days later from the gums, but need not occasion any alarm, as it is a necessary element in the process of healing.

Where necrosis has involved a large portion of the bone, it may be necessary to lay back a flap of the gum and cut away all the dead bone. Where the cavity is extensive, a packing of iodoform lint will greatly aid in a speedy recovery.

Every effort should be made to cure an abscess. But when all have failed, carefully extract the tooth, and, if the pericementum is not hopelessly broken down, remove all traces of disease, disinfect it, close the apical foramen with gold, and replant, or transplant a healthy one, first seeing that any existing dead process is removed. Treatment should not extend over a long period, but after that above indicated has been resorted to, nature should be left to finish the work. The amount of manipulation these tissues will tolerate and recover from is remarkable.

A specialist is very apt to become narrow-minded, and think local treatment all that is required to perfect a cure; and blindly will he battle with symptoms,—never stopping to consider the cause. The dentist is no exception to the rule. If he would establish confidence with the general practitioner, it might produce many happy results and avoid much anxiety and chagrin.

The general condition of the patient's health plays an important part, and has its influence in favor of or against success. It is often wise, before the treatment of a chronic disease, to refer your patient to his family physician for a course of treatment, at least of a general tonic nature. Or perhaps our own judgment might prescribe such remedies as the mineral acids, or the bitter tonics, or quinine in malarial districts, with nourishing food, and plenty of water between meals,—for the alimentary tract is susceptible of great benefit from washing, and the dyspepsia, indigestion, and constipation of our nervous patients are greatly relieved thereby. Of course too much importance cannot be attached to sunshine, fresh air, and change of climate. Wonderful beneficial results in these chronic cases are often derived from a sea voyage or a sojourn of a few weeks in the country.

A consideration of the *sequela* following chronic suppurative diseases would require more time than is now at command. It need only be said that among the most common affictions are general physical debility, nervous prostration, anæmia, blood-poisoning, and that most serious of all organic changes anyloid degeneration of the liver, kidneys and spleen. In these and scrofulous cases we meet with the greatest resistance in our efforts to effect a cure. Hence the great importance of associating general with local treatment.

At this point let me indulge in a few words of *criticism*. As dental surgeons we are expected to master all diseases that invade the oral cavity. Many of the older members of our profession seem to be falling behind and becoming what we may term "old fogies" in reference to this important feature of modern dental practice. I fear that a peep into the mouths of some of their patients would reveal an uninviting state of things. Even some who are teachers in our colleges need a more realizing sense of what is now required of them. They send out their graduates unprepared for the battle before them. Too many teeth are sacrificed to the moloch of ignorance. Modern patients appreciate the salvation of their teeth. (I recently heard a man say he would willingly give $10,000 to have his teeth back in the condition they were two years ago!) Is it not humiliating to think that what might have been restored to a life-time of usefulness were sacrificed for an artificial set, and this through the counsel of an old practitioner? Let me say to such a dentist, if you are not equal to the emergency, send your patient to one who is. If he is an honorable man, he will take no undue advantage of the circumstance, but will send your patient back to you for the work in which you excel. An unselfish man will study before all else the well-being of his patient, and receive his greatest reward in his future gratitude.

In *concluding*, let me say that the world is becoming more educated and enlightened on the subject of dentistry, and is learning to discriminate between the good and the bad. The catch-penny words of "low rates" and "satisfaction guaranteed" no longer deceive. People generally estimate them at their true worth, and pass by on the other side. Then let the dentist take courage, and keep abreast with the teachings and requirements of the day. The general surgeon looks to us to perform well our part as dentists, and to do so with credit we must thoroughly understand the subject upon which I have now addressed you, and apply its scientific principles in our practice. If this essay shall help you in that direction, you will not have given me your time and attention in vain.

ON THE USE OF THE AMPLIFIER, WITH OBSERVATIONS ON THE THEORY AND PRACTICE OF PHOTO-MICROGRAPHY, SUGGESTED BY THE DESIGN OF A NEW PHOTO-MICRO-CAMERA.

By GEO. W. RAFTER, M. Am. Soc. C. E.

In the proceedings of the American Society of Microscopists for 1884, there occurs a paper on Photography with High Powers by Lamplight, by Hon. J. D. Cox, of Cincinnati, Ohio. On page 100 I find the following: "Without pretending to be sure that my method is the best, I will still say that I have thus far got the best results by using the No. 1 ocular in the microscope and no other amplifier. It seems to me that after correcting the objective with care so as to present the best results to the eye directly, the satisfactoriness of image which is thus produced, is best kept by using both objective and eye-piece in photographing, precisely as in looking, and with the same length of tube; changing nothing but the fine adjustment, to correct the focus for the position of the camera-screen. Such, at least, is the conclusion I have tentatively reached."

The distinguished standing of the author of the above, among microscopists, both American and foreign gives it an authority which would not obtain if coming from a microscopist of less universal fame. It is with some little diffidence, therefore, that I presume to criticise his statement, and I cannot but regret that Mr. Cox has not given in more detail the experiments which have led him to this conclusion. Certainly his conclusions are exactly the opposite of that indicated by theory, and they are equally opposed to the practical results obtained by Dr. Woodward.

In recent times the tendency to simplify photo-micrography has led to an ignoring of some of the fundamental principles of the art, and this present paper will have amply fulfilled its mission, if it succeed in directing the attention of the more advanced workers o certain indispensable conditions, without an observance of which success cannot possibly be obtained.

Dr. Woodward as long ago as 1866,* pointed out the proper method of procedure for obtaining the best photo-micrographic results, and at that time laid down the following general principles which represent so far as the English literature of the subject is concerned, the first *complete* system of photo-micrographic practice.

(1) To use objectives, so corrected as to bring the *actinic* rays to a focus.

(2) To illuminate by direct sunlight, passed through a solution of ammonio-sulphate of copper, which excludes practically all but the actinic extremity of the spectrum.

(3) Where it is desired to increase the power of any objective, to use a properly constructed achromatic concave instead of an eye-piece.

(4) To focus on plate glass with a focussing glass instead of on ground glass.

(5) With high powers to use a heliostat to preserve steady illumination.

(6) Where an object exhibits interference phenomena, when illuminated with parallel rays, as is the case with certain diatoms and many of the soft tissues, to produce a proper diffusion of the rays by interposition of one or more plates of ground glass in the illuminating pencil.

I am aware that previous to this time much creditable work in photo-micrography had been done in England and on the continent of Europe, but Dr. Woodward's system as above given, is by far more complete than anything bearing upon the subject which had been produced up to that time. It is specially valuable in this particular, that it is the first recognition of the value of the achromatic concave amplifier for obtaining additional amplification instead of by use of an eye-piece, and it is due to this discovery† alone that he was able to make in the later years of his work the magnificent series of photographs of the test diatoms, and other difficult subjects which still remain on the whole unequaled by the productions of any other worker, and are likely to so remain for a long time to come, monuments to the photographic genius of Dr. Woodward. To him, therefore, may fairly be awarded the credit of having made photo-micrography as a practical art possible, of having, indeed, put it on such a basis, as to render easy the production of photographic representations of microscopic objects on a large scale. Previous to his day it was in effect only a scientific plaything.

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*On photo micrography with the highest powers as practiced in the Army Medical Museum. Am. J. Sci. and Arts, 1866, n. s., XLII, 189.

†Dr. Woodword states that he obtained the suggestion of such use of the amplifier from Mr. Lewis M. Rutherford.

Dr. Woodward's work in this direction, extending as it did, from 1865 to 1880, was naturally progressive in its character, and his papers bear witness not only to his indefatigable industry, but to his steady progress in knowledge of this difficult art. A history of photo-micrography for the period would be in effect an account of the work of Dr. Woodward.

Many of his most important papers are contained either in publications of the Surgeon General's office long out of print, or else in the foreign microscopical journals, and are in consequence, not readily accessible to the general student. A few of them are in the *American Journal of Science and Arts* and others in the *American Naturalist.**

It will not be amiss therefore to take up in this connection the more important papers, and briefly present their salient points.

(1) Report on the magnesium and electric lights, as applied to photo-micrography.†

In this paper can be found a full account of the adaptation of these lights to photo-micrographic work.

(2) Report on the oxy-calcium light ‡ as applied to photo-micrography. This is a continuation of the previous report.

(3) On the Structure of the Podura Scale and certain other test-objects, and of their representation by photo-micrography.§

Certain questions as to the value of monochromatic light are clearly presented in this paper.

Objects examined under the microscope by white light show both form and color, but photography, it is freely granted, can not reproduce the color phenomena. When, however, monochromatic light is employed, the color disappears and form alone is perceived. This method not only does not impair definition, but considerably improves it. Blue or violet are most agreeable to the eye, and these are also the colors most suitable for photography, but for mere observation any other color will answer. For producing monochromatic light, Dr. Woodward uses the ammonio-sulphate of copper cell, which gives a bluish violet light sufficiently monochromatic for all practical demands, whether of ordinary microscopic observation or of photographic representation. Dr. Woodward says: "When I compare the images of a difficult test as seen with any objective by such monochromatic light, with the best attainable with the lamp-light illumination ordinarily employed, I must confess to a feeling of astonishment, that this simple and potent optical resource is not more generally employed by microscopists, aside from all questions of photography. Not the least of its advantages is the fact that in the case of those objects which decompose light readily, the optical effects produced by this circumstance are at once eliminated, and the observer is consequently better able to judge reasonably with regard to the actual form."

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* For complete list of Dr. Woodward's papers, see Memoir of Joseph Janvier Woodward, by J. S. Billings. Read before the National Academy, April 22, 1885. I am indebted to this list for my references to the place of publication and reprint of Dr. Woodward's papers.

†Surgeon General's Office, January 5, 1870; also reprint Month. Micr. J.: 1870, III, 290; also Am. J. Sci. and Arts, 1870, 2. s., XLIX, 294; also Brit. J. Photog. 1870, XVII, 270–282; also J. Franklin Inst., 1870, LIX, 267.

‡Surgeon General's Office, 1870; also reprint Am. J. Sci. and Arts, 1870, 2 s., L, 366; also Month. Micr. J. 1870, IV, 64.

§Month. Micr. J., 1871, V, 149,

(4) The next important paper with which we are concerned was his Report on an Improved Method of Photographing Histological Preparations by Sunlight.*

In this paper Dr. Woodward shows that the diffraction phenomena, to get rid of which it had been customary to use a plate of ground glass, may be entirely obviated by the use of a suitable condenser, with the advantage of reducing the exposures for a magnification of five hundred diameters from three minutes to a fraction of a second, thereby producing pictures entirely free from diffraction and interference phenomena and characterized by greater contrast and sharpness of definition than can possibly be obtained by use of the ground glass.

Dr. Woodward also found that for such short exposures the heliostat could be dispensed with, and perfectly satisfactory pictures made without its use.

This paper is too long to more than notice here, but for the microscopist desiring to photograph by sunlight it offers a mine of information which cannot be too thoroughly worked.

Relative to the suggestion of working without a heliostat, I may say, in this connection, that I am in the habit of using magnifications of from eight to twelve hundred diameters, and having tried a rather crude form of heliostat have not found it any special advantage. The exposures are so short and mirrors can be so easily adjusted, that my present impression is to work without it altogether. My work room faces the South, with a window opening in that direction, and the camera stands on a long shelf at the east side. For sunlight work I use two mirrors, each six inches square, mounted in wooden frames and made adjustable to any inclination. With these mirrors, a condensing lens, achromatic condenser and the ammonio-sulphate cell, I am able to do photographic work with high powers, both easily and to my entire satisfaction. With such an illuminating apparatus properly handled, and the camera to be presently described, it is quite within the capacity of any person possessed of a moderate amount of patience to produce excellent photo-micrographic work, ranging from the easiest with low powers to the most difficult tests with high powers.

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*Surgeon General's Office, 1871; also reprint Am. J. Sci. and Arts, 1871, 3 s., II, 258; also Month. Micr. J., 1871, VI, 169; also Brit. J. of Photog., 1871, XVIII, 507.

I have also found (as Dr. Woodward suggests) that a blue glass may be substituted for the ammonio-sulphate cell, but I am bound to say that some care is required in its use with direct sunlight, or when looking down the tube of the microscope, injury to the eyesight may result.

For methods of manipulating the illuminating apparatus, so as to avoid the injurious effects on the objective of the heat rays, Dr. Woodward's papers furnish full and complete directions

About 1871, the question of resolution of *amphipleura pellucida* became a matter of considerable discussion among advanced microscopists and Dr. Woodward's photographs of that diatom still stand as unexcelled. He finally made admirable photographs of this test with a $\frac{1}{5}$th objective by Tolles.*

(5) On the Use of Monochromatic Sunlight as an Aid to High Power Definition.†

This paper gives detail of method of use of ammonio-sulphate cell, and method of preparing solution, together with hints as to selection of objective for use with monochromatic illumination and condenser. For the benefit of those who have never purchased an achromatic condenser, it is stated that any low power objective suitably mounted in the substage may be made to answer, even for the resolution of difficult test objects with high powers.

The use of monochromatic light is not recommended for low or medium powers, except when photographing, but for high powers the suggestion of a previous paper to use it for all difficult resolutions, is here enforced.

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*Announced in Month. Micr. J., 1871, VI, 150.

†Am. Naturalist, 1872, VI, 454; also reprint Month. Micr. J., 1872, VIII, 186.

As to whether monochromatic sunlight is injurious to the eye of the observer, Dr. Woodward says: "On this subject I can speak from an extensive personal experience in connection with photomicrography. The only injury to my own eyesight, of which I have ever been conscious, was produced by an injudicious exposure to the electric lamp. If the microscopist so manages his illuminating apparatus that the field of the microscope resembles in color and intensity the azure blue of the sky on a clear day (and this is the condition which should be always aimed at), I do not believe the use of the method for any reasonable time will be found injurious."

(6) The Application of Photography to Micrometry with special reference to the Micrometry of Blood in Criminal Cases.*

So far as I know, Dr. Woodward was the first to propose photomicrography as the most convenient method of accurately measuring the size of blood corpuscles. His method as given in this paper, was to place the blood upon a glass stage micrometer, and photograph with any convenient power both blood and the lines of the micrometer. In a good negative both are sharply defined, and measurements can be made direct.

For a series of photographs of blood from different animals, Dr. Woodward proposes the use of a micrometer, the error in which, if any, has been previously ascertained by comparison with a standard, and the constant of correction so obtained applied to all measurements made. Such a course will insure far more accurate results than can be attained by use of an eye-piece micrometer and with considerably less expenditure of time.

The detail of preparing the blood on the slide, the method to be followed in making the measurements, and certain possible sources of inaccuracy which are to be guarded against are all given at length in the body of the paper, together with directions as to the photographic manipulation. At the end are given tables of measurements of human blood, that of the dog and also of the Guinea pig.

As to the value of photographic evidence in criminal cases, Dr. Woodward says: "Perhaps I ought not to go so far as to say that no expert who goes into court to testify about blood stains deserves to be listened to by a jury, unless he takes with him photographs of the blood examined on a stage micrometer; but certainly it must be admitted, that hereafter the most trustworthy expert-testimony in such cases will be that which is corroborated by photographic evidence.

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*Am. M. Ass., 1876, XXVII, 303; reprint Phila. M. Times, 1875–6, VI, 457; also Month. Micr. J., 1876, XVI, 144.

The general introduction of this severe method of recording accurately the facts observed, is the more desirable, because of late a spirit of exaggeration seems to have possessed certain experts, who either boldly claim, or in ambiguous language obscurely insinuate, that they possess the power of discriminating human blood from that of other animals in the dried stains which are submitted to examination in criminal cases." *

(7) Observations suggested by the study of *amphipleura pellucida*, mounted in Canada Balsam, by Lamplight and Sunlight, with various Objectives.†

This was the last important paper on photo-micrography and in many respects the most important of all. In it is given with more detail than in any previous paper the true theory and practical use of the concave achromatic amplifier, as an aid to the photography of difficult tests. The following is a summary of the more important photographic points.

The first part of the paper is an account of the best mode of projecting images upon the screen for photographic purposes with homogeneous immersion objectives, the discussion being chiefly with reference to the performance of a $\frac{1}{8}$ and $\frac{1}{12}$ received from Zeiss of Jena, in October, 1878. These objectives have no screw collar adjustment, and their aberrations are completely corrected only when the image is formed at a distance of ten inches. It was desired however, in order to obtain the necessary magnification of the photographs to use them with the screen at a distance ten to fifteen times as great as ten inches. With the naked objective this would bring the objective so much nearer the object than its normal working distance, for which normal position it alone is corrected, that the resulting aberrations would quite destroy the image. This difficulty had occurred to Zeiss before sending the objectives, as he had furnished with them two concave lenses said to be of twenty-five and thirty centimetres focal length. These were to be screwed into the posterior part of the brass mounting of the objectives when using them for photography, the supposition being that the aberrations induced by distance would be corrected by such procedure. It was found on trial that these correcting lenses were so unsatisfactory, that, had no other means of projecting images with these objectives been available, Dr. Woodward could not have succeeded in presenting a photographic demonstration of their excellent qualities.

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*On the similarity between the Red Blood Corpuscles of Man and certain other Mammals, especially the dog; considered in connection with the Diagnosis of Blood stains in Criminal Cases. Am. J. M. Sci., 1875, n. s. LXIX, 151; also abstract in Bull. Phil. Soc., Wash., 1874-8, II, 20; also reprint Month. Micr. J., 1875, XIII, 65.

In this paper Dr. Woodward defines in his severely logical style, the duty of experts in criminal cases, as follows: " If the microscopist, summoned as a scientific expert to examine a suspected blood stain, should succeed in making out the corpuscles in such a way as to enable him to recognize them to be circular disks, and to measure them, and should then find their diameter comes within the limits possible for human blood, his duty, in the present state of our knowledge is clear. He must, of course, in his evidence present the facts as actually observed, but it is not justifiable for him to stop here. He has no right to conclude his testimony without making it clearly understood, by both judge and jury, that blood from the dog and several other animals would give stains possessing the same properties, and that neither by the microscope, nor by any other means yet known to science, can the expert determine that a given stain is composed of human blood, and could not have been derived from any other source. This course is imperatively demanded of him by common honesty, without which scientific experts may become more dangerous to society than the very criminals they are called upon to convict."

†J. Roy. Micr. Soc. 1879, II, 663; also reprint Am. J. Micr., 1879, IV, 141.

Before receiving these objectives, however, Dr. Woodward had theoretically devised a method of making such projections, which on trial fully answered his expectations, and gave at any distance, images quite equal in flatness, definition and brilliancy to the best obtained with the ten inch tube under the usual conditions of microscopic observation.

This method consists of placing an achromatic negative lens in the draw tube, and slipping it by trial to the proper position to bring the image to a sharp focus on the screen, while the objective remains in precisely the same focal position that was found to give the best result with the ten inch tube. The course of the rays under these circumstances remains the same to whatever distance the image is projected, and provided the concave has the requisite qualities, the sharpness of the image is unimpaired.

Having failed to use the new Zeiss' objectives satisfactorily for photography, with the correcting lenses furnished with the objectives by Herr Zeiss, Dr. Woodward then substituted an amplifier made by Tolles, and used as above detailed. This amplifier was a negative achromatic meniscus of about 6.5 inches virtual focus, and 0.7 of an inch in diameter.

With this Tolles' amplifier, a series of photographs of *amphipleura pellucida*, mounted in Canada balsam, were made with the Zeiss and other objectives belonging to the Museum, with the result of demonstrating the superiority of the Zeiss $\frac{1}{12}$ over all the objectives which Dr. Woodward had ever examined.

In concluding this part of the subject, attention is specially called to the fact that for photographing difficult resolutions it is of prime importance that the proper position of the amplifier should be found for the distance selected. A neglect of this may produce very unsatisfactory results with excellent instruments.

The second point discussed in the paper relates to the obliquity of the illuminating pencil, necessary to resolve difficult test objects, such as *amphipleura pellucida*, mounted in Canada balsam by objectives of adequate aperture.

The third point is as to the resolution of difficult tests mounted in Canada balsam by monochromatic sunlight. Both of these points are discussed in such manner as to make the discussion of the greatest interest to the practical photo-micrographer, but I can only call attention to the matter here.

In addition to the above, papers on A simple device for the Illumination of Balsam-mounted objects for examination with certain Immersion Objectives whose Balsam angle is 90° or upwards,* and on The Oblique Illuminator—an Apparatus for obtaining Oblique Illumination at definite Angles,† may be read with profit by the photo-micrographer. Many of the other papers also contain matter of interest and value. The above specially noted are the more important to the practical worker.

The optical principles involved in photo-micrography are somewhat complicated, and I deem it proper therefore, though nothing new can be added to them, to briefly review the more important points.

Lenses produce images and depend for their magnifying power upon the two laws of refraction which are thus stated‡:

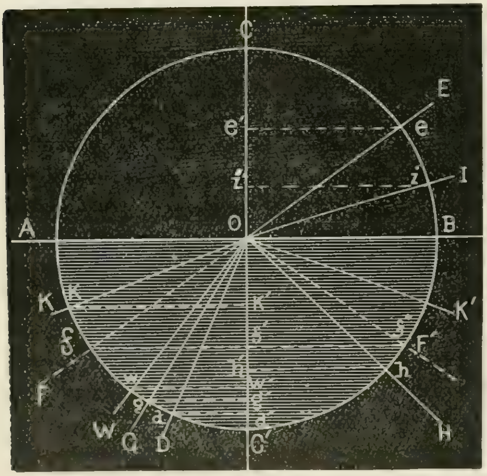

Fig. 1.

(1) A ray of light passing from a denser into a rarer medium is refracted towards a line drawn perpendicular to the plane which divides the two media.

Let A B (Fig. 1) be the plane separating two media, as, for instance, air and water, and let E O be a ray of light passing from the air into the water at O. Instead of following the course of O F in continuation of the line E O the ray is, on passing into the water bent towards C C′, perpendicular to A B at O, and takes the direction O W. The angle E O C is called the angle of incidence and the angle C′ O W the angle of refraction.

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*Month. Micr. J., 1877, XVIII, 61. Also J. Roy. Micr. Soc., 1878, I, 246.

†Am Quart. Micr. J., 1879, I, 268; also abstract J. Roy. Micr. Soc., 1879, II, 769.

‡See Natural Philosophy by Deschanel, translated by J. D. Everett. *Traite Elementaire de Physique* by A. Ganot, or any good elementary treatise on Physics.

As a corollary to the first law it may be noted that these angles lie in the same plane, or the plane of refraction is the same as the plane of incidence.

(2) For any given substances the sines of the angles of incidence and refraction are in a constant ratio. This is known as the law of sines.

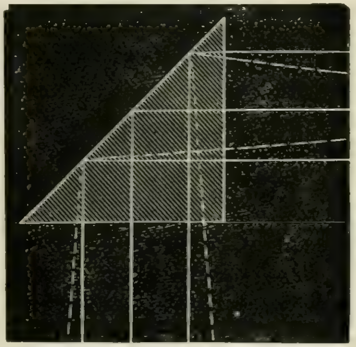

FIG. 2.

Again referring to (Fig. 1) we have the ray E O after refraction in water taking the direction O W as before. By trigonometry the line e e′ let fall from e perpendicular to C C′ is the sine of the angle E O C. Also w w′ perpendicular to C C′ is the sine of the angle C′ O W. The index of refraction is the ratio of these two sines,[*] and in expressing the relations between them, the sine of the angle of refraction is considered as the unit to which the sine of the angle of incidence bears a fixed relation. Letting *i* represent the index of refraction, I the angle of incidence and R the angle of refraction we have the equation:—

$$i = \frac{\text{Sin I}}{\text{Sin R}} \qquad (1)$$

In (Fig. 1) if we consider E O as passing in succession into water, flint glass and the diamond we would have the successive refractions O W, O G and O D, and the corresponding sines w w′, g g′ and d d′, from which we conclude that the refractive index of flint glass is greater than water, and that of the diamond greater than either.

There are farther some deductions from these laws to which I wish to draw special attention because of their important application in photo-micrography.

(*a*) A ray of light passing from one medium to another perpendicular to the plane which separates them, undergoes no refraction, but passes on in a straight line as though in the same medium.

(*b*) Of several rays passing from a rarer to a denser medium at different angles those nearer the perpendicular are refracted less than the more inclined rays.

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[*] In practice the refractive index is measured by allowing the ray of light to pass from a *vacuum* into the medium whose index it is desired to determine.

(*c*) When rays pass from a rarer to a denser medium, of those which are considerably inclined to the surface of the denser medium, a certain portion are reflected from that surface instead of passing into the denser medium and undergoing refraction, and the more they are inclined, or the greater the sine of the angle of incidence, the greater will be the loss from such reflection.

In connection with the subject of refraction there is to be considered the case of total reflection.

Referring to (Fig. 1) and considering A B as the plane separating media of different density, as before, we will let E O and I O represent incident rays in the rarer medium and O D and O G the corresponding refractions in the denser medium. Suppose now the line I O revolves in the plane of the paper about O as a center, I moving towards B. The corresponding refracted ray will move towards O F, and O W may be taken as one of its positions. For the position I O = B O and the angle of incidence C O B = 90° there is a position of the refracted ray which we will take as O F. The angle C′ O F is called the critical angle and is computed when the index of refraction is given as follows: Let x represent the critical angle, then,

$$\frac{\text{Sin } 90^\circ}{\text{Sin } x} = i$$

but the sine of

$$90 = 1, \text{ therefore } i = \frac{1}{\text{Sin } x}, \text{ or}$$

$$\text{Sin } x = \frac{1}{i} \qquad (2)$$

that is to say, the sine of the critical angle is the reciprocal of the index of refraction.

For air and water C′ O F is equal to approximately 48° 30′. Fo air and different kinds of glass it varies from 38° to 41°.

This leads us to a discussion of the phenomena of total reflection.

Again referring to (Fig. 1) let K O be an incident ray in the denser of two mediums, making the angle of incidence C′ O K greater than the critical angle C′ O F, then, instead of the ray passing into the rarer medium at O it will be totally reflected in the denser medium, passing in the direction O K′, and making the angle C′ O K′ = C′ O K. This is in accordance with the law of reflection, that the angle of reflection is equal to the angle of incidence.

Again assume that F O which has just been shown to be the limit of the critical angle for the given media is made to revolve about O.

taking such a position that F is very slightly nearer A. If F O is then considered to be an incident ray instead of being refracted in the line O B along A B, the ray would be reflected in the line O F′, making the angles of incidence and refraction equal as in the previous case. It follows from this demonstration that as soon as the critical angle is reached an entire change of condition occurs, the laws of refraction cease to operate and the rays become instantly amenable to the laws of reflection.

Reflection occurring under these conditions is nearly perfect, there being very little loss of light.

Advantage of this principle is taken in the various arrangements of prisms, one of which is illustrated in (Fig. 2). The full lines show parallel rays and the dotted lines the course of rays which have been made divergent by passing through a lens before coming to the prism.

A knowledge of the laws of refraction and of the refractive powers of various substances is of considerable importance in preparing objects for photo-micrography.

The following table gives the indices of refraction of several substances*:

Diamond	2.440 to 2.775	Glycerine and water, equal parts	1.400
Anise oil	1.811	Glacial acetic acid	1.380
Bisulphide of carbon	1.678	Alcohol	1.372
Tolu-balsam	1.628	Ether	1.360
Cassia oil	1.610	Albumen	1.350
Flint glass	1.576 to 1.642	Aqueous humor of eye	1.337
Crown glass	1.531 to 1.563	Vitreous humor of eye	1.339
Rock salt	1,545	Crystalline lens, outer coat	1.337
Canada balsam	1.530 to 1.540	Crystalline lens, inner coat	1.379
Linseed oil (sp gr. 0.932)	1.482	Crystalline lens, central portion	1.400
Turpentine oil (sp. gr. 0.885)	1.478	Sea water	1.343
Pure glycerine	1.475	Pure water	1.336
Olive oil	1.470	Air at 32° F and 30 in	1.000,294
Sulphuric acid	1.430	†New glass	1,516 to 1.963

Such a table of refractive indices becomes of the greatest value to the photo-micrographer when preparing his objects. Advantage may be taken of it to determine the medium whose refractive index differs most from that of the object which it is desired to photograph, as by selecting such a medium the distinctness of the object may be more clearly brought out.

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*Compiled chiefly from Deschanel's Natural Philosophy and Behrens' Microscope in Botany. For more extensive table see Jour. Roy. Mic. Soc., 2 s., Vol. iii, 1883, 588.

†Pamphlet by Prof. Abbe and Dr. O. Schott. Extracts in J. Roy. Mic. Soc. October, 1886, where a tabes of indices of refraction of most of the novelties in the way of the new apochromatic glass may be found.

For objects of a high refractive index we should use, therefore, a medium of the lowest possible refracting power.

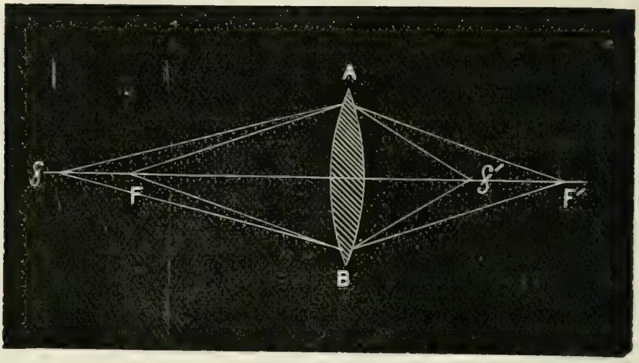

FIG. 3.

With objects, however, which are so opaque as not to transmit light at all, or which transmit it very slightly, the use of a medium of high refractive index will assist in rendering the object transparent and bring out details, which in fluids of low refractive index could not be seen; or, if seen at all, very imperfectly.*

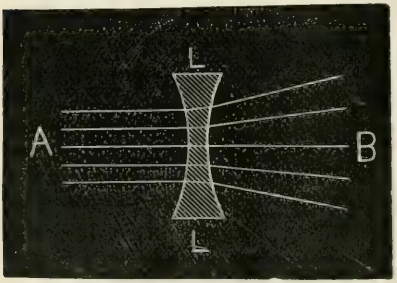

FIG. 4.

Lenses are of two classes, converging lenses and diverging lenses. The double convex lens may be taken as the type of converging, and the double-concave as the type of diverging lenses.

Converging lenses are so called because rays are more convergent or less divergent after passing through them than before. In (Fig. 3) rays diverging from *f* and F, after passing through the lens A B are converged to *f'* and F'.

Diverging lenses produce the opposite effect, that is, rays which were either parallel or convergent before passing through them are made to diverge by transmission, as for instance, in (Fig. 4) the parallel rays from A are caused to diverge as at B. In (Fig. 5) we have rays, which, before entering the lens L′ L′, are already divergent, made more divergent.

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*Behrens' Microscope in Botany, page 159, and Frey The Microscope and Microscopical Technology, page 118.

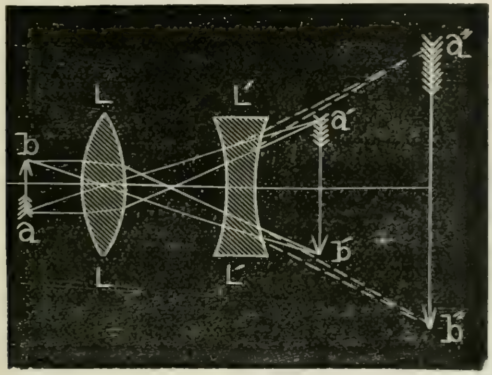

FIG. 5.

Fig. 6 serves to illustrate the refraction of rays through a prism. A B is an incident ray in the rarer medium, passing into the glass prism at B and refracted towards the perpendicular N B, called a normal, in the line B C. Passing out of the prism at C the ray takes the course C D, being bent away from N′ C the normal at C.

We may conclude from the above that lenses are simply cases of prisms, and that in general the discussion of a lens may be made on the supposition that it is a prism, or, more properly, a wedge. Fig. 7 illustrates the relation existing between the two forms.

A lens is usually a solid of revolution and the line about which the revolution has taken place is called the principal axis of the lens. Rays which were originally parallel to the principal axis are, after passing through a convex lens made by virtue of the refractions which have taken place to converge approximately to one point on the principal axis, which is called the principal focus. The distance of the principal focus from the lens is called the focal length.

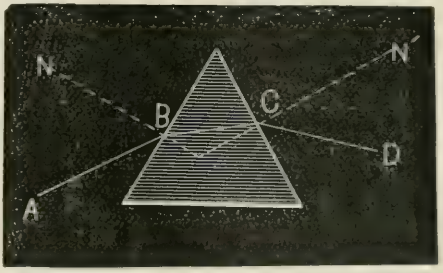

FIG. 6.

In (Fig. 3) we have the case of points of light radiating from *f* and F on the principal axis, and after passing through the lens A B brought by refraction to the points f' and F′ respectively. The points f and f' and F and F′ are called conjugate foci.

In (Fig. 8) let O and O′ be the centers of the spherical surfaces of a lens. Let O D and O′ B be parallel radii of these surfaces, and let the line B D joining their ends represent a ray of light passing through the lens. O D and O′ D are parallel by construction, therefore the normals at B and D will be parallel. The incident ray A B is therefore parallel to the emergent ray D E. Drawing the dotted lines through B and D, representing tangent planes at those points, we may consider the ray as passing through a plate bounded by those planes. That is, the ray A B D E takes the same direction in passing through the lens under the assumed conditions, that it would through a plate bounded by parallel planes.

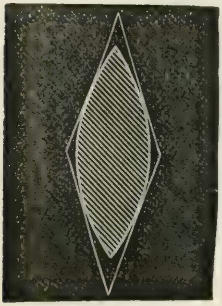

FIG. 7.

Let C be the point in which the ray B D cuts the principal axis O O′, and let r and r′ denote the radii O D and O′ B respectively. The triangles O C D and O′ C B are similar, and we have the proportion :—

$$\mathrm{r} : \mathrm{O\,C} :: \mathrm{r}' : \mathrm{O'\,C}$$

$$\text{or} \quad \frac{\mathrm{r}}{\mathrm{r}'} = \frac{\mathrm{O\,C}}{\mathrm{O'\,C}} \qquad (3)$$

that is to say, the line joining the centers O and O′ is divided in a definite ratio by the point C, the value of which depends upon the radii of the two surfaces.

From the above demonstration the following conclusions are drawn :—

(*a*) Any ray whose direction on emergence from a lens is parallel to its direction before entering must pass through the point C.

(*b*) The converse of the above, that any ray which passes through the point C must have parallel directions on entering the lens and when emerging.

The point C is the optical center of the lens.

In elementary optical demonstrations the thickness of the lens may be neglected, and the incident and the emergent rays taken as lying in the same straight line, and we may say in general terms, that rays which pass through the optical center undergo no deviation.

Any straight line through the optical center other than the principal axis is called a secondary axis.

Fig. 3, already referred to, shows the formation of conjugate foci on the principal axis. Fig. 9 shows the formation of similar conjugate foci on a secondary axis.

We may note that the formation of conjugate foci is the foundation of the theory of images, and farther, that such foci are only formed on principal and secondary axes.

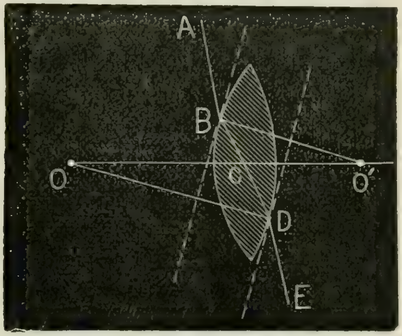

Fig. 8.

It may farther be noted that when one of a pair of conjugate foci advances towards a principal focus on one side of a lens, the corresponding conjugate on the opposite side recedes, and that the more distant focus is always moving away more rapidly than the nearer one is approaching. Thus in (Fig. 9), F' F and *f' f* are corresponding conjugates. If F' is considered as moving along the secondary axis to the point *f'* then F takes the position *f*.

Again referring to (Fig 5) let L L be a double convex lens representing the lens system of an objective; a b an object between the lens and the principal focus on that side; a a' and b b' secondary axes drawn from a and b respectively through the optical center. Also consider parallel rays of light radiating from a and b; these, after passing through the lens are refracted to a' and b', meeting the secondary axes a a' and b b' at those points; conjugate foci are formed at a' and b' whose corresponding initial foci are a and b. From this results the formation at a' b' of a real magnified image of the object a b. It is evident from the figure that the size of a' b' is to the size of a b, as their distances from the optical center respectively.

Suppose, however, that the double concave lens L' L' is so placed as to intercept the rays from a b after they have passed through L L and before coming to a focus at a' and b'. By such interception the rays are made more divergent, and the image instead of being formed at a' b' is formed at a'' b''. It is moreover apparent from the figure that if L' L' is placed in any other position in reference to L L that the image a'' b'' will still be formed, and that it will advance or recede from L L as L' L' advances or recedes.

It is also apparent from what has gone before that if the object a b is brought nearer to L L the divergence of the axes a a' and b b' will be increased and a new image may be farther projected to any required distance (within limits) by proper placing of the lens L' L'.

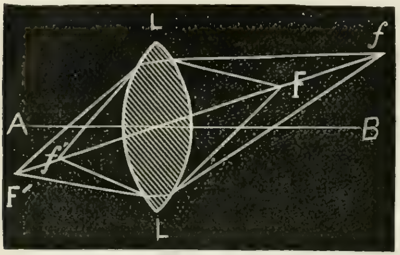

Fig. 9.

Fig. 5, therefore, illustrates the formation of photographic images when photographing with the naked objective or with the concave amplifier.

The practical fact has been repeatedly observed that when using the naked objective in photo-micrography, for considerable extension of the camera, the objective is brought so much nearer the object than its normal working distance that aberrations are introduced which frequently completely destroy the sharpness of the image, or in the case of high powers, the objective is brought so near the object, that, with the short working distance which such objectives always have, it is found impossible to focus at all for any considerable extension of screen. This difficulty has usually been met by the use of the eye-piece, but this unfortunately, introduces an entirely new set of conditions and difficulties, which have been found more impossible to reconcile than the comparatively simple ones which occur when using the naked objective.

From the diversity of opinion which prevails as to the relative advantages of these different methods of projecting the photographic image I have been led to suppose that the theory of the matter is not generally understood, and the optical part of this paper is therefore an attempt to set forth the theory in its proper light.

With the amplifier, however, the difficulties above enumerated are immediately removed, all that is required being to find by trial such a position of L' L' as will give, for any position of a b with reference to L L, a distinct image at any required position of the screen a″ b″. That this is very easy may be gathered from the preceding discussion of the work of Dr. Woodward.

Fig. 10 illustrates the principles involved in the projection of an image with the eye-piece. a b is the object, and L L the lens system of the objective as before, and a' b' the real aerial image formed by the objective. L' L' represents the eye-piece. The rays after coming to a focus at a′ b′, and forming the real image a′ b′, diverge, and, on undergoing refraction in passing through L′ L′, are again brought to a focus and produce the image a″ b″, which may be received upon a screen. From the preceding principles it is evident, that, in producing a photographic image by this method, there is not only great loss of light, but also great loss of distinctness of the image. From the theory of the formation of conjugate foci on principal and secondary axes it is apparent, that, on and in the vicinity of the principal axis, the image is more distinct than at points off of the principal axis, and that the farther any point of the image is removed from the principal axis the greater will be the indistinctness. Again the indistinctness of the image will increase in proportion to the amount of divergence of the secondary axes passing through the extremities. Moreover the Huyghenian eye-pieces, which are generally used for this purpose are not really achromatic combinations. Their apparent achromatism is produced, not, by bringing the red and violet images into true coincidence, but, by causing one to cover the other as seen from the position of the observer's eye*.

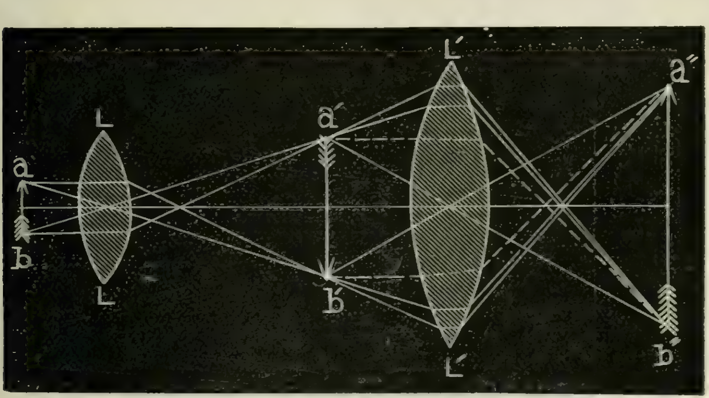

FIG. 10.

But the conditions, which obtain in vision through an eye piece are quite different from those which obtain when an image is projected through an eye-piece upon a screen. So different are they, indeed, that, when the microscope is focused for ordinary microscopic vision through an eye-piece, there is no position of the screen, which will give a distinct image without changing the position of the focus, either of the objective or the eye-piece, and such change of necessity, introduces conditions which effectually destroy the apparent achromatism of the eye-piece as used for microscopic vision. Fig. 11 in comparison with (Fig. 10) will show the difference between projection upon a screen and ordinary microscopic vision through an eye-piece. Referring to (Fig. 11) let L L be the eye lens of an eye-piece, E E is taken to represent the lenses of the human eye and R R the retina. r, r′, r″ and r‴ are rays of light which have undergone refraction through the field lens of the eye-piece, and which are brought to a focus at a and b, forming the real image a b. After forming the image a b the rays r, r′, r″ and r‴ pass on towards L L and are farther refracted after which they pass into the eye E E, forming on the retina R R the image a″ b″, which by the theory of vision is seen under such a visual angle as to apparently project it to a′ b′. The conditions for distinct vision with the eye-piece are that the rays r, r′, r″ and r‴ after refraction by the lens L L shall become *nearly* parallel, but converging towards A enough to meet the secondary axes through a and b (that is the axes, a C and b C) at same points, a′ and b′, where the virtual image a′ b′ is formed. In microscopic vision through an eye-piece, therefore, we do not see the real image of the object, but an image of an image, or the virtual image.

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*Deschanel's Natural Philosophy, page 907.

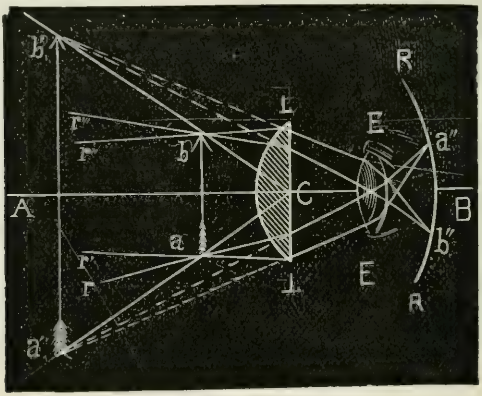

FIG. 11.

It is apparent moreover from an inspection of (Fig. 11) that under no condition could the rays r, r′, r″ and r‴ be made to converge after passing through L L; they are made divergent, and, will always remain so, without another lens is interposed, or else that the relative positions of eye-piece and objective are so readjusted as to cause them to converge after passing through L L. It follows from this that when the adjustment is made for vision there is no position of the screen which will give a sharp image. The truth of this may be readily demonstrated by experiment, when it will be found that with the screen very close to the eye-piece an indistinct image is formed, and, leaving the relation of eye-piece and objective the same, the farther the screen is removed from the eye-piece the more indistinct the image becomes. This accords perfectly with the theory as exhibited by (Fig. 11).

Referring again to (Fig. 10) it may be seen that the converse of the above proposition is equally true, that, when the adjustment is made for the projection of an image, it is equally impossible to get microscopic vision.

We also see by comparing (Figs. 10 and 11) why the change of combination necessary to project an image upon the screen must, of necessity, destroy the apparent achromatism of the eye-piece. The correction is made, as above stated, for bringing the violet and blue spectra, not coincident, but one above the other, when the eye-piece is used for vision. But such use renders rays divergent, which in projection of an image are required to be convergent. It would seem to follow, therefore, that these spectra will separate in proportion, interfering materially with the perfection of the image. The essential truth of this statement may be readily determined by experiment.

In any case, in photographing with the eye piece, changes in distance of screen from object should be compensated for, not by changing the focus of the objective, but by changing the position of the eye-piece. The objective being once set, to such position as gives the best image with normal length of tube and eye-piece should then be left undisturbed, and the adjustment for position of screen made by change of position of eye-piece.

This practical difficulty in the use of eye-pieces for projection appears to have occurred to the eminent German optician, Carl Zeiss of Jena, as I find in his recent catalogue an account of a series of what he calls "projection eye-pieces." I quote the description in full*:

" They consist of a convex lens and a compound system which, lkie the apochromatic objectives, is most carefully corrected, both spherically and chromatically and is *entirely free from secondary chromatic aberration and from difference in focus between the visual and chemical rays**. Between the convex lens and compound system a diaphragm is introduced for limiting the field. The system can be made to approach or recede from the diaphragm.

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*Pamphlet in English, New Microscope Objectives and Eye-pieces made with special kinds of glass from the Jena Glass Manufactory (Schott & Co.) by Carl Zeiss, Optical Factories, Jena, 1886

"When used to project an image upon a screen for demonstration or upon a photographic plate the objective of the microscope remains in exactly the same position as when observing with an eye-piece. After a preliminary adjustment of the specimen by means of an ordinary eye-piece, the projection eye-piece is put in its place and its projection lens so adjusted that the edge of the diaphragm is focused as sharply as possible on the screen or ground glass of the photographic camera; this is accomplished by screwing out the projection lens more or less according as the distance between the screen or plate and the microscope is reduced or increased. Finally the image of the object is sharply focused on the screen or ground glass by the usual adjustments. *The length of body for which the objective is adjusted for oculur observation must always be exactly retained.*†

"The cap of the projection eye-piece forms a diaphragm by which any reflection from the body-tube is completely shut off. The size of the aperture of this diaphragm corresponds with the highest aperture of the apochromatics. When using those of 0.6 or 0.3 aperture it may occasionally be desirable to decrease the available aperture of the objective in order to obtain uniform sharpness of definition up to the margin of the field. For this purpose each projection eye-piece is supplied with two diaphragms of smaller apertures which fit in place of the normal one. It must not be forgotten to remove these from the eye-piece, if the full aperture of the objective is to be effective.

"Projection by this method gives extremely sharp, uniformly illuminated pictures of any desired degree of amplification.

"The projection eye-pieces are specially corrected for our apochromatics on the principle of the compensating series, but may, nevertheless, be advantageously employed with ordinary achromatic objectives of large aperture."

It would have been some little gratification to optical students had Herr Zeiss seen fit to set forth more clearly the optical principles involved in these new projection eye-pieces. Possibly he has done so in some of the German periodicals, but thus far I think no such exposition has appeared in any of the American or English microscopical journals.

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*The italics occur in the original.

†The italics occur in the original.

Lacking such complete exposition of the optical principles involved a few provisional criticisms are offered.

In the first place, calling them eye-pieces is evidently a misnomer, as, referring to the above description, it appears that they can not be used for microscopic vision. The preliminary adjustment of the specimen must be made with an ordinary eye-piece, after which the projection eye-piece is placed in position. This changing of eye-pieces is in itself a serious objection in high power work, where the slightest disturbance of the apparatus leads to such disarrangements as must necessitate a new adjustment. All practical photo-micrographers will agree with me, therefore, that any process which necessitates the removal of one piece of apparatus, and the substitution of another in its place is for high power work fundamentally defective. The inevitable disturbance of apparatus which will occur in making such changes, leads not only to loss of time, but usually to deterioration of the negative. Nor do I in making this criticism overlook the fact that the focusing of the object is, according to Herr Zeiss' description, completed after such change of eye-pieces. The criticism is made on the broad ground that any substitution of apparatus, whatever, is undesirable, provided the best results can be obtained without such substitution. That such results can be obtained in a more satisfactory way I will attempt to show in the sequel.

Again, the description in general terms answers to that of a Huyghenian eye-piece, that is, they consist of a convex lens (the field lens presumably), and a compound system (the eye lens presumably), with a diaphragm between them. They differ from the Huyghenian eye-pieces in this, that the compound system is truly achromatic, and that it is made adjustable in reference to the diaphragm*. Such adjustment evidently having reference to the bringing of the rays to a focus as shown in (Fig. 10.)

I have no doubt but that the making of such an achromatic combination would materially improve the performance of eye-pieces when used in photo-micrography. However the objection to the use of *any* eye-piece still remains valid. The crossing of the rays after passing through the eye lens, and the consequent great obliquity which they attain must still result in unnecessary loss of light and considerable impairment of the sharpness of the image. Certainly, until some expert worker shall have actually produced by such an arrangement photo-micrographs finer than those made by Dr. Woodward, we are justified in assuming that the use of the simpler optical combination of the adjustable achromatic amplifier is, on the whole, preferable[*].

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*It is of course understood that the field lens of the Huyghenian eye-piece is simple, composed of one piece of glass only.

It farther appears, from this point of view, that Herr Zeiss has unnecessarily complicated his projection eye-pieces by making the compound system adjustable with reference to the diaphragm. The really important point, it would seem, was to make them achromatic and then, having once set the objective to normal working distance, to compensate for changes in position of screen by withdrawing the eye-piece. From present information it would appear that equally satisfactory results could be so obtained with some little gain in the matter of simplicity.

At any rate the result of a trial of this appliance will be awaited with no small degree of interest[†].

In order to exhibit with clearness the relation between working distance and length of tube I have taken a Bausch & Lomb three-inch professional objective of 12° angular aperture and made the approximate measurements recorded in the following table. They serve to exhibit, in a general way, the great influence on working distance exercised by length of tube. These measurements are made with the naked objective :

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[*] In the J. of the Roy. Micr. Soc., for Feb., 1887, page 20–34, Prof. Abbe has a paper on Improvements of the Microscope with the aid of New Kinds of Optical Glass. Referring to the use of projection eye pieces, rather than the amplifier, for correcting the aberrations produced by distance of the screen, he cites as a chief objection to such use of the amplifier, the "minute and troublesome manipulation in the adjustment, if a good correction of the objective is to be secured."

Attention may be directed to the fact that the addition to the photo-micro-camera of specific mechanical appliances for instantly making this correction, entirely disposes of the above objection, and to the farther fact, that, inasmuch as Prof. Abbe has not given any other objections to the use of the amplifier for this purpose, it must be considered that the above is the chief objection that can be urged.

[†] Am. J. Sci. and Arts, 1861, xxxii, 186. On the practical Application of Photography to the Microscope, by Prof. O. N. Rood

Prof. Rood states that in the course of his investigations he had three eye-pieces constructed. No. 1, on the general Huyghenian plan, the eye-lens being an under corrected *achromatic*, in which the distance between the eye lens and field lens could be varied at pleasure, as advised by Amici. Prof. Rood says the general performance of this eye-piece seemed somewhat better than the plain Huyghenian eye-pieces with which it was compared.

No. 2 was a Kellner eye-piece in which the distance between the lenses could be varied. The performance was good.

No. 3 consisted of two achromatic lenses combined in the Huyghenian manner. This, I infer from Prof. Rood's statement, to have been inferior.

It appears, therefore, that Herr Zeiss' projection eye-pieces hardly have the merit of novelty.

Magnification Diameters.	Length of Tube Length of Camera in Feet.	Working Distance, in Inches.
——	0.83[*]	1.96
——	1.15	1.67
10	1.97	1.44
20	3.81	1.33
30	5.64	1.29
40	7.47	1.27

It appears from this table that in extending the camera from ten inches to seven and one-half feet, the working distance of such an objective is reduced from 1.96 inches to 1.27 inches, or 0.69 of an inch.

The normal working distance of a wide angled four system homogeneous immersion $\frac{1}{8}$ objective is about 0.02 of an inch, and of a similar $\frac{1}{12}$ about 0.0133 of an inch[†]. If the decrease in working distance of either objective is at all proportional to focal length it is evident that difficulty would be found in working either of them at an extension of from seven to eight feet. That such difficulty exists is within the experience of all workers in this department, but I am not aware that any precise measurements have been made of such decrease for higher powers. Approximate results can, of course, be obtained by computation.

The fallacy has prevailed to some extent that the concave amplifier may be legitimately used to increase the working distance of objectives. A little consideration will convince one, however, that such use can only result in an impairment of the image.

Again, referring to (Fig. 5), consider a′ b′ as a fixed position at which it is desired to receive the image, as, for instance, in microscopic vision a′ b′ may be taken as at the diaphragm of the ocular. With the amplifier L′ L′ in place the image a″ b″ may be made to move towards the position a′ b′ either by moving the lens L′ L′ towards L L (within limits), or by moving the object a b away from L L. Such moving of a b away from L L is, in effect, an increase of the working distance of L D. It is evident, however, that by so moving a b away from L L we immediately disturb the normal working of the objective, and, independent of the theoretical condition, a practical trial will readily convince one that such increase is followed by impairment of the sharpness of the image.

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[*] This measurement is made with normal working tube of ten inches, as used by the Bausch and Lomb Optical Co., who measure the ten inches from the focal plane of the objective to the diaphragm in the ocular.

[†] For tabulated working distances of four system homogeneous immersion objectives from $\frac{1}{4}$ to $\frac{1}{25}$, as made by Mr. Gundlach, see Catalogue of Gundlach Optical Co.

By way of farther illustrating this part of the subject I have made a series of approximate measurements of the working distance of a so-called two-inch objective of a tabulated aperture of 15°. I say so-called two-inch, because while this is the maker's designation, it appears on the application of a Cross' formula* to have in fact only 1.455 inches focal length instead of 2 inches as called for.

The photo-camera offers a convenient method of obtaining the approximate focal length of an objective, and as the method is not yet generally understood among American microscopists, I will briefly reproduce the formula here.

Referring to (Figs. 9 and 10) it may be shown that the primary formulæ for expressing the relations between conjugates, principal focus and size of image are

$$\frac{1}{f} = \frac{1}{p} + \frac{1}{p'} \qquad (4)$$

$$\text{and} \quad m = \frac{p'}{p} \qquad (5)$$

in which f is the focal length for parallel rays, p and p' variable conjugates, p being the distance from the optical center to the object, p' the distance from the optical center to the image, and m the magnifying power.

The distance from object to image can always be measured and we may take,

$$p + p' = l.$$

Clearing the equations (4) and (5) and substituting the value of $p + p' = l$ and combining, there results :—

$$f = \frac{m\,l}{(m + 1)^2} \qquad (6)$$

This formula is perfectly true for simple lenses and approximately true for complex systems such as we have in microscope objectives.

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*See paper on the Focal Length of Microscope Objectives, by Charles R. Cross, in the Journal of the Franklin Institute for June, 1870, 401; also reprint in Month. Micr. Jour., 1870, IV, 149. Also for farther discussion of the same subject, paper by Dr. Woodward, Remarks on the Nomenclature of Achromatic Objectives for the Compound Microscope, in Am. J. Sci. and Arts, 1872, 3s. III, 406; also reprint in Month. Micr. J., 1872, VIII, 66; also Am. J. Micr., 1881, VI, 77.

That it is not rigidly true for objectives is due to the fact that they have no optical center of which the position can be exactly fixed.

For complete discussion with the results of carefully made measurements, see Mr. Cross' original paper, and also Dr. Woodward's.

The approximate measurement of the so-called two-inch is given in the following table :

l, in inches.	m	$f = \frac{m\,l}{(m+1)^2}$
48	31	1.453
60	39	1.462
72	47.6	1.451
84	56	1.447
96	63.6	1.463

Mean = 1.455*.

The result m will be in the same unit as l.

The working distance of the above objective with ten-inch tube is 0.96 inch.

At an extension of camera screen of 6.0 feet the working distance of the naked objective is 0.76 inch.

With camera screen still remaining at an extension of 6.0 feet, and with an amplifier of 6 inches negative focus so placed that the front of the amplifier lens is 4.75 inches back of the posterior lens of the objective the working distance is again brought to 0.96 inch.

It follows, therefore, that this position gives the proper relation of amplifier and this particular objective for producing the best photographic result at an extension of 6.0 feet.

The following series show the effect of amplifier in increasing the working distance beyond the normal amount.

With amplifier immediately back of posterior lens of objective (about one inch away), and with camera screen extended to 8.0 feet, the working distance is found to be 1.15 inch.

With same conditions, except that screen was at 3.0 feet, the working distance is 1.22 inch.

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*Dr. Woodward in his paper, Remarks on Nomenclature of Achromatic Objectives for the Compound Microscope, gives a method by which any microscopist can measure the focal length of his objectives by use of stage and eye-piece micrometer. This consists in removing the field lens of the eye-piece and ascertaining the magnification by comparing the divisions in the same unit of the two scales. The distance between the two scales is measured, and the following rule derived from the formula may then be applied :

Multiply the distance between the two micrometers by the magnifying power, and divide by the square of the magnifying power plus one ; the result will be the equivalent focal length.

From a consideration of (Figs. 5 and 10) and the above measurements, it appears evident that when the amplifier is nearer the objective than the position for normal working, the working distance of the objective is increased.

The converse is equally true, that when the amplifier is placed at a greater distance from the objective than the position of normal working, the working distance of the objective is decreased, but not in so great a degree as when the naked objective is alone used. For instance, with the amplifier 12.0 inches from the posterior lens of the objective it appears that the working distance is 0.89 inch. At the same distance this objective gave when used without the amplifier a working distance of 0.76 inch as above stated. The importance of having ready means of adjusting the amplifier is therefore rendered apparent by these measurements.

In order to get such ready means of adjusting the amplifier and to develop a photo-micro-camera which would answer all the demands which might be made upon it I have designed the apparatus shown in (Fig. 13). This is really a Photo-micro-camera complete within itself, and not a microscope and camera combined. I found early in my experience as a photo-micrographer that one instrument could not be made to do the work of two, and that it was only possible to use photography as a real aid to microscopical investigations by having photo-micrographic apparatus, which in addition to being always ready, also possessed the quality of easy adjustment to any and all kinds of work. The present design possesses not only all these qualities, but it can also be furnished at a price quite within the reach of any person really desiring such an aid to scientific investigation.

A reference to (Fig. 12) in conjunction with (Fig. 13) will show the novel points.

A in (Fig. 12) is the stage, B is a nose-piece which carries the objective and also a removable collar carrying the tube C, which is supported by a removable pillar shown in (Fig. 13.) Inside the tube C is a second tube made to work back and forth very easily and carrying at its lower end a right angle prism set for total reflection. This tube is of such a length as to give, when in position for receiving the image, from the objective through the prism a length of 10 inches measured along the optical axis. The eye-piece in the outer end has cross-hairs set in the diaphragm, so adjusted, in relation to the prism at the other end, as to correspond with cross lines on the ground-glass of the camera screen. The tube C, therefore, gives the opportunity to examine the object under the conditions of microscopic vision, and with the cross-hairs in the eye-piece farther enables the operator to exactly center the object on the screen.

F is an adjustable tube carrying within it a second tube, which may be slid back and forth. This interior sliding tube has an adapter at the front end into which an amplifier may be screwed, and the whole racked back and forth by the pinion F, which also carries between the thumb-screw and the body a pulley over which a band can be passed for working the amplifier from the rear of the camera screen.

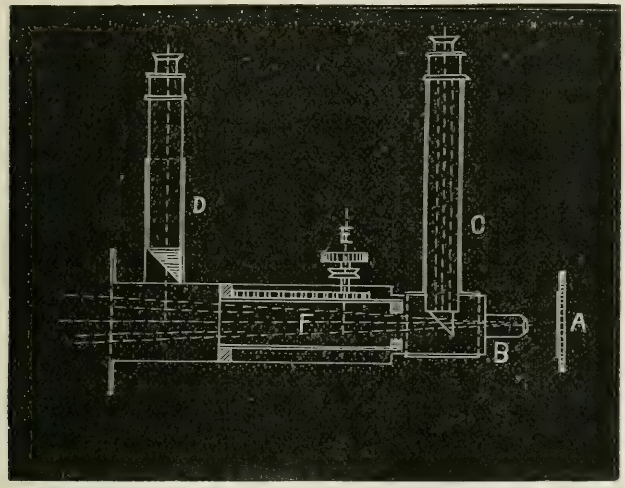

FIG. 12.

This inner tube also has a graduation on the side in order to facilitate recording the proper position of the amplifier for various extensions of the screen.

In working with high powers where it is desirable to use the amplifier, the objective is set to normal working distance by observing the object through the tube C. The operator then, from the rear of the camera, by use of the band over the pulley at E, racks the amplifier to such a position as to give a sharp and distinct image on the ground-glass, the objective in the meantime remaining undisturbed. It is of course understood that after having adjusted the objective to normal working distance the inner tube at C, carrying the prism and eye-piece has been sufficiently withdrawn to allow the rays of light to pass unobstructed to the camera screen. This gives us almost instantly the conditions which have been shown above to be necessary for production of the highest results, and with this apparatus the most difficult tests are easily photographed.

When working with low powers the amplifier is not essential for the production of sharp images, and the tube C and nose-piece B are removed by simply slipping off the collar from the nose-piece and unscrewing the nose-piece from the body, an operation which may be performed in a moment. Fig. 14 shows these parts when detached.

After removing B and C, the inner tube F is drawn forward so that the front end of it occupies, approximately, the position of B when in place, and the objective is screwed into the adapter in end of said tube F, which in high power work carries the amplifier.

D is a second tube back of F, with prism and eye-piece with cross-wires, precisely as in C. With this tube the object is examined and centered on the ground-glass, as above described, for work with C. After such centering, the focusing is completed either by use of the band passing over the pulley at E, or by use of the long rod and fine adjustment to be described below. The inner tube at D is shown as drawn back in such position as to allow the rays of light to pass unobstructed to the screen.

The camera itself has both bellows and base made in sections each two feet in length. The sections of the bellows can be readily removed, or additional sections inserted, when greater extension is required.

A section of the base is shown in the foreground of (Fig. 13) and the method of attachment may readily be inferred from the cut. The brass rod for working the fine adjustment is shown passing through the middle of said section of base in foreground of (Fig. 13). The ends of this focusing rod are attached by an automatic coupling so made that there is no chance for lost motion.

The plate and screen holder is racked back and forth as clearly shown in cut.

On the side of the base is a graduation in feet, tenths and hundredths of a foot which enables one to record positions of the screen for producing given magnifications easily.

The fine motion is communicated to the stage, and not to the objective, as is clearly shown in (Fig. 13)*.

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*This fine adjustment was designed by Mr. Edward Bausch of the Bausch and Lomb Optical Co., and is the same as described at page 68 of the last edition of their catalogue (the tenth). The fine motion is, in effect, a heavy plate moving upon finely turned rollers, and held to its horizontal position by a strong spring, the motion being communicated by a fine-threaded screw working against the spring. There is absolutely no lost motion, and it will answer every purpose for focusing objectives of high power.

I may say in this connection that the optical part of the camera was constructed for me by the B. & L. Optical Co., and I am considerably indebted to Mr. Bausch for hints as to the detail. To his practical knowledge is due in no small degree its perfection.

The camera, as shown in the cut admits of an extension of 8 feet, and sections of base and bellows similar to those above described can be added, extending it almost indefinitely. The extension above given will, however, answer all ordinary demands.

In its present form the camera takes a 6½ x 8½ plate, and all sizes less than that down to the smallest*.

This apparatus has been specially designed with reference to doing photo-micrographic work of a high character with the greatest possible economy of time. It is for this purpose that the second prism tube has been added specially for low power work without the amplifier, and I have no difficulty in making with this camera a half dozen negatives in an evening, when working with lamplight and the amplifier, or from eight to ten in the same time when working with low powers and without the amplifier, in each case doing my own developing. In working by sunlight, where much shorter exposures are required, the same length of time gives an additional amount of work.

In case one has an extra microscope, the new apparatus for working the amplifier may be adapted to it at moderate expense, and by construction of the bellows and extension arrangements as above described, the more important advantages of the camera gained.†

I desire, however, to put myself on record as opposed to the combination instruments—those which are to be used for microscopy ordinarily, but which can be, when one has something worth photographing, for the time being transformed into a camera. The trouble with all such instruments is, they have, in general, failed to do satisfactory photo-micrographic work.

For rapid work the camera should be placed on a shelf on one side of the room, at such a height as to bring the horizontal prism tubes level with the operator's eye. The position of the camera at one side of the room insures economy of space and does away with the objection that the camera, even though of considerable size, takes up much room.

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*This is accomplished by the use of a universal plate-holder, designed by Mr. F. A. Brownell, manufacturer of photographic apparatus. This plate-holder is arranged with sliding bars held to any required position by spring clutches so that any sized plate from the maximum used, to the smallest, may be inserted as quickly as though the holder were adapted to only one size of plate. This gives economy of plates without loss of time, as one can always use the size of plate adapted to the magnification which it is proposed to obtain.

Mr. Brownell constructed the camera proper (wood-work and bellows), and to his practical knowledge of photographic cameras is due in no small measure the perfection of that part of the detail which admits of ready interchange of parts of the bellows and increase of extension.

†The Bausch & Lomb Optical Co., have fitted up one of their Concentric microscopes with the apparatus for adjustment of the amplifier, for Dr. J. Edw. Line, Conductor of this Journal, embodying the improvements above described. This makes an admirable photographic outfit, but at somewhat greater expense than for the camera.

When it is intended to work by lamplight only, it will not matter which side of the room is used for this purpose, and the operator may locate the camera to suit his surroundings; care must be taken, however, to have the graduation of the base on the side away from the wall. If one has plenty of room, the best arrangement would, of course, be to erect a shelf on horses in the middle of the room, so that the camera is accessible on both sides.

When it is intended to work by sunlight the camera must of necessity be at either the east or west side of a room with an exposure to the South, or when economy of space is of no importance it can be conveniently placed in front of a window facing the South in which may be fitted up the necessary arrangements for heliostat, mirrors or condensing lens.

In any case the surroundings will decide to some extent just what arrangement will be adopted.

The following are, so far as I know, the new features embodied in this camera :

1.—The application of specific appliances for moving the amplifier back and forth, in order to find by trial, for any given extension of the camera, the best position of the amplifier for projecting the image upon the screen.

2.—The application of two horizontal prism tubes, one for use with high powers, and the amplifier, and the other for use with low powers without the amplifier.

3—The detachable nose-piece and prism tube for high powers only (Fig. 14).

4.—The cross wires in the diaphragm of the eye-piece of the prism tube, giving an immediate centering of the object on the camera screen.

5.—The making of the bellows in sections in such manner as to admit of their easy removal or of a ready indefinite extension.

6.—The making of the base in sections in combination with the focusing rod, connected by an automatic coupling.

7.—The plate holder which admits of all sizes of plates from the maximum of 6½ x 8½ to the smallest without the use of kits.

Another new feature, which however is not specifically claimed, is this: If one has a prejudice in favor of photographing with an eyepiece, or if from motives of economy, one desires to dispense with the amplifier and work with the eye-piece, this may be done by simply inserting an eye-piece in the back end of the amplifier tube. For so working, an adjustable nose-piece for carrying the objective without the high power prism tube may be furnished, thus dispensing with one of the prism tubes, which however can be added at any time by change of nose-pieces. The object can be still centered by the posterior prism tube which is permanently fixed to the body, and the projection of a sharp image upon the screen completed by moving the eye-piece with the pinion E, (Fig. 12.)

The general claim is made, therefore, that this camera embodies more nearly all the conditions necessary for rapid and successful work than anything heretofore produced.

I have no doubt, however, but that a very considerable improvement can still be made, and confidently expect in view of the great interest now centering in photo-micrographic work, that the next few years will develop such improvements.

Concluding the subject I will briefly describe some of the more important cameras now offered to microscopists.

1.—That of Zeiss in his catalogue of 1885*.

This, in effect, is one of his microscopes adapted to photo-micrographic work by the addition of bellows, focusing rod, etc.

The description is as follows:—" The arrangements corresponding to the special purpose of the camera are:—

" 1.—The connection with the microscope. For this purpose the camera is fastened to a strong wooden support, which also carries the microscope, its fine adjustment being worked from in front of the support by a long Hooke's joint.

" In order that the axis of the microscope may be brought into line with that of the camera, the former stands on a heavy metal plate, adjustable by three screws, which again can be easily moved by hand laterally on the wooden support. * * * *

" The end of the camera directed towards the microscope terminates in a long, funnel-shaped brass nozzle, blackened inside, which carries a brass jacket worked by rack and pinion ; this is easily removed should it be desired to view the interior of the camera. The connection of this nozzle with the body of the microscope so as to be impervious to light, is very easily made by inserting the above described rack-work jacket into a capsule fitting the end of the body tube. * * * *

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*No. 27, Catalogue of Microscopes and Microscopical Accessories Manufactured by Carl Zeiss, Jena, 1885, English Edition.

"The microscope may be fitted to or withdrawn from the apparatus without the slightest loss of time.

"2.—The arrangements for regulating the adjustment of the picture. A rough focus and adjustment of the size and position of the picture is made on the ordinary ground-glass slide; for the fine adjustment this is replaced by a frame containing a disc of transparent plate glass having in its center a diamond-cut cross. A low power magnifying lens is focused on this work and moved over the glass plate by means of a carrier at the same focal distance. The roughly adjusted picture is now accurately focused by means of the Hooke's joint attached to the micrometer screen of the microscope, the observation being accurately controlled by the above lens. The interchange of the ground-glass plate with the diamond marked plate, and the latter with the sensitive plate holder, is effected in the simplest manner and without the smallest loss of time."

Referring to the description of the microscope to be used with this camera, at page 28 of the same catalogue, I quote as follows:—"The body, with rack and pinion adjustment, is shorter and of greater diameter than that of stand I, so as to interfere as little as possible with the cone of rays transmitted by the objective; at its upper end is a screw thread to take either a light excluding arrangement to connect the camera with the stand, for photographing without an eye-piece, or a graduated draw-tube for photographing with an eye-piece. The draw-tube is also tapped at its lower end with the ordinary objective thread to receive when required a photographic correcting lens, to correct the objective as ordinarily adjusted for a picture 1 to 1½ meters distant."

The above quotations are specially interesting in this connection as indicating that Herr Zeiss still holds, in spite of Dr. Woodward's demonstration to the contrary, to the use of a photographic correcting lens instead of the more elegant adjustable concave amplifier.

The second camera is that of Dr. Herman Fol*. This is a vertical camera intended chiefly for work with low powers and for the production of stereoscopic pictures.

2.—The photo-micrographic microscope of Nachet†. The novel point of this camera is the use of the prism tube somewhat as I have arranged it in my camera, and I very willingly acknowledge my indebtedness to M. Nachet for the suggestion. He has, however, used the tube vertical, and as a fixed part of the apparatus.

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*Illustrated and described in the Journal Roy. Micr. Soc., Feb., 1886, Ser. II, VI, 144.

†Illustrated and described in Journal Roy. Micr. Soc., Oct., 1886, Ser. II, VI, 840.

3.—The camera of Mr. Walmsley.* This, in its latest improved form, has many excellent points, among which may be mentioned its convenient extension and ready conversion into a copying, enlarging or reducing camera. It may be made to do very good work.

4.—Finally, the camera of Mr. Atwood†, which is of interest as being the first attempt to design a camera specially for photo-micrography independent of the microscope. At the present time its chief value is as an illustration of the evolution of cameras, and I acknowledge, with pleasure, my indebtedness to it as affording the original suggestion of the Professional Photo-Micro-Camera now offered to microscopists.

Farther, in conclusion, the attention of photo-micrographers may be called to descriptions of appliances in Beale‡, Sternberg§, Jennings‖ and Malley¶. I do not refer particularly to the descriptions of apparatus given by these authors, as I suppose their books will be found in the hands of every practical worker.

Since completing the main body of this paper I have had an opportunity to test the photographic qualities of two new apochromatic objectives and I desire to express my gratification at their performance. They give images which, on the whole, I have never seen excelled. The objectives in question were made by the Gundlach Optical Co., and are one and one-half-inch and one inch focal length, and they give satisfactory results without any compensating or projection eye-pieces. Both of them appear to have absolute coincidence of the chemical and visual ray, as, on comparing the developed negatives with the images on the screen, I was unable to detect any difference. Independent of the additional brilliancy and sharpness which follow from the more perfect achromatism of these objectives, this matter of perfect coincidence of the chemical and visual rays is a great advance, inasmuch, as the troublesome and uncertain correction for that difference is entirely obviated. These objectives are moreover equal to any I have ever seen of the same power for ordinary microscopic work, and I infer that in the future all microscopists who work at photography will prefer the apochromatic objectives.

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*In its latest improved form described in an Illustrated Catalogue of Photographic Cameras, Lenses and other Apparatus and Materials for Photography. W. H. Walmsley & Co., Philadelphia, 1886.

†Illustrated and described in Catalogue of Bausch & Lomb Optical Co., Trans. of Am. Soc. Micr. and J. Roy. Micr. Soc.

‡How to Work with the Microscope, by Lionel S. Beale, F. R. S., Pres. Roy. Micr. Soc., 5th ed., Pt. V, On Taking photographs of Microscopic Objects, 284–342.

§Photo-Micrographs and How to Make Them., by Geo. M. Sternberg, M. D., F. R. M. S., etc

‖How to Photograph Microscopic Objects, a Manual for the Practical Microscopist, by I. H. Jennings, New York, 1886, E. & H. T. Anthony & Co.

¶Photo-Micrography, by A. Cowley Malley, F. R. M. S., etc., 1885.

With such objectives of medium and high power we may hope to realize the theoretical possibility of superior resolution by photography over that obtained by ordinary microscopic vision. The possibility of this has been pointed out* as a necessary result of Prof. Abbe's theory of diffraction, but by reason of the impossibility of obtaining absolute coincidence of the chemical and actinic rays, from whence it results that the images formed by the chemical rays are less distinct than the visual image, it has not thus far been possible to attain this desirable end in practice.

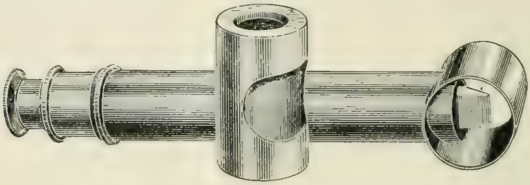

FIG. 14.

***On the limits of Resolution in the Microscope, by Frank Crisp, in J. Roy. Micr. Soc., 2s, Vol. V, 1885, 968.**

CONDUCTOR'S DEPARTMENT.

Eighty pages, and yet enough matter on hand to make it eighty more. The several articles in this number are long ones, and might have been divided with a later issue; but our dislike of the serial story forbid. Mr. Geo. W. Rafter's article is the only one of the kind extant, and will interest the many photo-micrographers of the profession.

SYMPOSIA A AND B.

It may interest some to know how those symposia came about. Those having the matter in charge called upon Dr. Howe to take the initiative. When he had finished his paper he sent it to the committee, who had it reproduced by a type-writer, omitting the name of the author, and every other possible feature that might lead to his identity. The type-writer copy was then sent to Dr. Stockwell for review, comment, criticism, and presentation of his views. Both papers were then sent back to the committee, Dr. Stockwell's treated as Dr. Howe's had been, and both forwarded to Dr. Clark, with instructions to "go for 'em." The whole thing was so well managed throughout that until the appearance of the call for the meeting, each continued ignorant of the name of his symposical associate. By this method the personal factor was wholly weeded out, and as a consequence the idea and not the man "harrowed unto death?" Drs. Curtis and Weld were brought together by less secretive methods.

"ENAMEL AND DENTINE," ETC.

In the *Dental Cosmos* for June, Dr. Geo. S. Allen has an article on the new theory of the structure of the above tissues, and finds himself opposing that histological trio, Heitzman, Abbott and Bödecker. The much vaunted reticulum, according to Dr. Allen, fails to show up even in slides prepared, illustrated and described by the gentlemen themselves, and to confirm his conclusions based on personal examination of the slides in question kindly loaned for the purpose by the preparators, he quotes Prof. R. R. Andrews, of Cambridge, as follows:

> Cambridge, Mass., May 2, 1887.
>
> Dr. George S. Allan, New York:
>
> Dear Dr.:—In your letter of April 22 you ask me to give my ideas in reference to the new theory of the structure of enamel, and also to give the result of my recent study of Prof. Abbott's slides illustrating his paper on this subject.
>
> In regard to the new theory of the structure of enamel, I have given all the time I could spare since hearing the paper read by Prof. Abbott, and have examined many slides of thin enamel, some of which were examined by Prof. Heitzmann in his labatory and pronounced by him to show the reticulum. These specimens I have examined critically, with a most excellent $\frac{1}{15}$ objective of Tolles, and *am assured* that nothing like the reticulum figured by him can be demonstrated in them. In regard to the recent study of Prof. Abbott's slides, which he so kindly loaned for that purpose, I could find no appearance whatever of fibrils resembling the exquisite drawings made by Prof. Heitzmann, illustrating the article published in the April number of the *Dental Cosmos.*
>
> Very truly yours, R. R. Andrews.

We shall hear more of this later on.

The Board of Census passed five of the candidates for the degree of M.D.S., and the degree was conferred by the Society at the morning session. Two of the five successful candidates are also D.D.S's.

PELLETS.

It was a dogmatic meeting.

The American Dental Association will meet at Niagara Falls.

Dr. J. Morgan Howe treats blind abcesses with "distinguished consideration."

Everything points to the success of the Oral and Dental Section of the International Medical Congress.

Dr. A. Y. Moore, of Cleveland, well known to readers of microscopical literature, died April 16th, 1887.

"What! Never used *yuba cissi?* Young man, we'll come up to your place some day and hold a calf meeting on you."

Some day Dr. Clark is going to read Dr. Stockwell another lecture. The latter will laugh, of course, but not again at Dr. Clark's expense.

According to the *Meadville Daily Tribune*, the *Dental Review* "put its foot in it" when it credited a questionable paragraph to a local D.D.S.

He gave us his picture—Dr. Atkinson, we mean. He calls it "Civil Service Reform." It's a good one just the same, and prized accordingly.

Dr. G. V. Black's illustations in the *Dental Review* are fine in every particular. Plate paper would be none too good for them, and show them off to much better advantage.

Dr. Louis Ottofy, of Chicago, has published an examination chart, a copy of which should be in the hands of every dentist at all interested in gathering statistics relating to teeth. He may be addressed at 1228 Milwaukee Avenue.

"I too, have my doubts of the success of Younger's operation; but that it can be done at all—a living union effected between the alveolar process and gums and the *dried* (not dead by a damn sight) pericementum, is glory enough even without success—counting the latter complete when favorably compared with the permanency and usefulness of other and undisturbed teeth."—*Extract from letter from profane friend interested in the Younger operation.*

The unanimity with which several of the district societies petitioned for the abrogation of the M. D. S., granted by the New York Society, suggested something like concerted action. Where did the movement begin? By whose instigation? Don't know? Funny.

Dr. John Ashurst, Jr., says in the *Polyclinic*: "A felon should be opened midway between the artery and tendon. If necessary, it can be opened on both sides. If the sheath of the tendon is opened, the tendon will almost always slough, and the finger will be useless."

Some one has said—"To save your strength, use it; to get tired, do nothing" Alice Wellington Rollins says of her potter:

"Slowly he raised his patient eyes,
With homely truth inspired;
'No, marm, it isn't the foot that *kicks*,
The one that *stands* gets tired.'"

Mem. for those outside of New York State who do not love our Society and its ways—The fact that the resolutions from four of the district societies in regard to the M.D.S., were almost unanimously voted for (apparently endorsed), of itself goes for little, for many, if not all of them, knew that its intelligent consideration could be had only in the State Board of Censors, the only body capable of deciding the question upon its merits and its far reaching effects.

"Ah, Doctor, you dentists held a convention last evening. Large attendance, I suppose?"

"About a dozen."

"'About a dozen!' Why, I thought it was a convention?"

"No; simply a meeting."

"Ah!"

Hereafter one dentist at least will *meet*, not *convene*; attend *meetings*, *conventions* never.

They dined. Salmon automaticum, French tubing, lettuce (drink), boiled rubber stoppers, lyonnaise molars, rubberdam pie, milk, water-pipes and gum are a few of the many choice dishes. They fished, no man swore even a little bit, hip-pocket rods were forbidden, fish stories were disallowed, and the fellow detected in charming the fish by spitting on his hook was fed to a man-eating shark. And yet they had a good time, thanks to Wilmington and Welch.

"The larynx now goes up
The glottis with a slam,
From out the throat emits a note
Pushed by the diaphragm."

Dr. Chas. F. Ives finds Merks preparation of cocaine the best for making the Herbst obtundant. The formula has been frequently published, and is as follows: "Cocaine, 15 grains, in 1 drachm chemically pure sulphuric acid; supersaturate with sulphuric ether. Apply to dentine with platinum pointed instrument.

BOOKS, PAMPHLETS, ETC.

AMERICAN SYSTEM OF DENTISTRY. In Treatises by Various Authors. Edited by Wilbur F. Litch, M.D.,D.D.S., Philadelphia: Lea Brothers & Co. Vol. II., Pp. 1117.

This volume is divided into two parts—Operative and Prosthetic Dentistry. Under the first heading Jack discusses the Stopping Process with Gold, and the Related Proceedures; Bödecker, the Herbst (German) method; Bennett, Plastic Materials; Palmer, Electro-Chemical Relations of Stoppings to the Teeth; Harlan, Calcareous Deposits; Truman, Discolored Teeth, and their Treatment; Guilford, Orthodontia; Weld, Replantation and Transplantation; Stellwagen, Extraction.

Under the second heading, taking Impressions of the Mouth, Plaster Models, Antagonizing and Contour Models are treated of by Bennett; Geometrical and Mechanical Laws of the Articulation of Human Teeth, and a System of All-Porcelain Crown Substitution, by Bonwill; Metallic Dies and Counter-dies, Artificial Dentures on Bases of Gold and Silver, and Pivot Teeth, by Trueman; Continuous Gum Work, by Smith; Artificial Dentures on Bases of Fusible Alloys, by Chupein; Celluloid and Zylonite, by Evans; Crown and Bridge-work and Metallic Facings for Carious Crowns, by Litch; Moulding and Carving, by Hall; Hygenic Relations of Artificial Dentures, by Kirk; Dental and Facial Types, by Ivy; Obturators and Artificial Teeth, by Baker.

Like its predecessors this volume is fully illustrated.

PROCEEDINGS OF THE AM. SOCIETY OF MICROSCOPISTS. 1886. Pp. 143.

Every year sees an increase in the work accomplished by this young and vigorous society, and a corresponding increase in size and importance of its annual publication. A new feature appears this year in the form of beautifully colored plates of diatoms and crystals of butter, beef, and lard. It contains also several heliotypes and numerous cuts illustrating the text. The committee of publication—Prof. D. S. Kellicott, Dr. Geo. E. Fell and Prof. W. A. Rogers—has done its work thoroughly and well.

THE

Odontographic Journal.

Volume VIII.—*October, 1887.*—*No. 3.*

THE LEGAL STATUS OF DENTISTS.

BY DANIEL NASON, ESQ., NEW YORK.

Mr. President and Members of the Dental Society of the State of New York:

It is my purpose this evening, in the first place, to review briefly the English statutes and, still more briefly, the statutes of the State of New York relating to the practice of dentistry—and this for the reason that a knowledge of this particular branch of our subject will be interesting to you from an historical standpoint rather than useful to you in the practice of your profession; in the second place, to state some of the general principles of law defining the duties and responsibilities of dentists toward their patients; and, finally, some of the general principles of law defining their rights both as against patients and as between themselves.

The first reference in the statutory law of England to anything pertaining to the practice of dentistry is found in an act, entitled, For Barbers and Surgeons, passed in the thirty-second year of Henry VIII. By the third section of this act anyone who "uses barbery or shaving" in the city of London, its suberbs, and within a circuit of one mile is forbidden "occupying any surgery, letting of blood, or any other thing belonging to surgery, drawing of teeth only except."

The subject finds no further mention on the English statute books till 1858, when the necessity for some improved system of dental education having become more fully recognized, power was given to Queen Victoria to grant a charter to the Royal College of Surgeons of England authorizing that body to institute and hold examinations for the purpose of testing the fitness of persons to practice as dentists and to award certificates of such fitness*. In the following year the charter was granted, and under it dentists to a certain extent received a statutory status; but they were in no sense placed on an equal footing with medical men. The title "dentist" was not protected in any way; nor was the practice of dentistry restricted solely to persons holding certificates from the Royal College of Surgeons of England, as the act itself expressly declared that nothing therein contained should be construed to prejudice or affect in any manner the lawful occupation, trade, or business of dentistry†. The statute, moreover, did not entitle dentists to registration under the Medical act, and, as a consequence, though they might recover their reasonable charges for work and labor done and materials supplied, they could not recover such charges in the right of their holding certificates from the Royal College of Surgeons‡.

Thus the law continued till the Dentists act was passed in 1878§. This act first sets forth the expediency of making provision for the registration of persons specially qualified to practice as dentists in the United Kingdom and for otherwise amending the law relating to dental practitioners, and then provides, that, from and after the first of April, 1879, no one, under a penalty not exceeding £20, upon conviction, excepting those who are legally qualified medical practitioners, shall take, or use the name, or title of dentist either alone or in combination with any other word or words, or of dental practitioner, or any name, title, addition, or description, implying that he is registered under this act, or that he is a person specially qualified to practice dentistry, unless he is so registered; and, further, unless so registered or unless a legally qualified medical practitoner, no one can recover any fee or charge in any court for the performance of any dental operation or for any dental attendance or advice. Anyone is entitled to registration under The Dentists Act who is a licentiate in dental surgery, or dentistry, of any of the medical authorities‖; or who is entitled to registration as a foreign or colonial dentist; or who was bona fide engaged in the practice of dentistry, either alone or in conjunction with the practice of medicine, surgery, or pharmacy on or before July 22d, 1878.

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*21 & 22 Vict., c. 90, s. 48.

†S. 55.

‡Greenwood, Laws, 60.

§41 & 42 Vict., c. 33.

The medical authorities empowered to appoint boards of examiners, and to grant licenses for dental surgery, are all such as have power for the time being, to grant degrees in surgerv, viz: The Royal College of Surgeons of England, the Royal College of Surgeons of Edinburg, the Faculty of Physicians and Surgeons of Glasgow, the Royal College of Surgeons of Ireland and any other university in the United Kingdom.

The first statute containing general regulations concerning the practice of dentistry in the State of New York, though dental colleges to which power had been given to issue diplomas to their graduates, had been previously incorporated, was enacted in 1868, and is entitled An Act to Incorporate Dental Societies for the Purpose of Improving and Regulating the Practice of Dentistry in this State[*]. This act provides for the organization of the District Dental Societies and the Dental Society of the State of New York, and has been amended so that the president of the latter society is authorized to issue diplomas to persons who have fulfilled certain requirements and passed satisfactory examinations, conferring upon them the degree of Master of Dental Surgery[†].

In 1870 a law was enacted making it a misdemeanor for anyone knowingly and falsely to claim or pretend to have or hold a certificate or license, diploma or degree granted by any society organized under and pursuant to the provisions of the act of 1868, or who should falsely or with intent to deceive the public, claim or pretend to be a graduate from any incorporated dental college[‡].

Other laws have since been passed making it unlawful for any person to practice dentistry in this State for a fee or reward unless he shall have received a proper diploma or certificate of qualification from the State Dental Society, or from the faculty of a dental or medical college recognized as of reputable standing by the State Dental Society[§]; and, hereafter, every person authorized to practice dentistry within the State must, before commencing practice, register in the office of the Clerk of the County where he intends to locate[‖].

The general principles of law which define the duties and responsibilities of physicians, lawyers, and other classes of men whose employment requires the exercise of special skill and knowledge apply as well to dentists[¶].

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[*] L. 1868, c. 152.

[†] L. 1870, c. 331.

[‡] Ibid.

[§] L. 1879, c. 540. It has been recently held, however, by a court of inferior jurisdiction in the City of New York that a regularly licensed physician and surgeon may practice dentistry without the sanction of the State Dental Society.

[‖] L. 1881, c. 576.

[¶] Elwell, Malpractice, [illegible].

The nature of the contract between dentist and patient is like that between physician and patient, and attorney and client; it is a contract of hire*; on the one hand, there is a promise that the party employed will render certain services in a manner suited to his undertaking; and, on the other hand, a promise that the party employing will pay a suitable reward for the services rendered.

On part of the dentist the contract is purely voluntary in its inception, as plainly his profession is not of that public nature which would require him to render his services promiscuously to whomsoever may call for them; but having once entered into the contract, unless dismissed by the patient or the party employing him, or unless he withdraws after having given reasonable notice of his intention to withdraw, the law imposes upon the dentist the duty of fulfilling the obligations incident to the contract.

A dentist, like anyone else who offers his services to the public generally for employment in a professional capacity, contracts with his employer; first, that he possesses a reasonable and ordinary degree of skill and learning; and, second, that he will use a reasonable and ordinary degree of care and diligence in the exercise of his skill and in the application of his learning to accomplish the purpose for which he is employed†.

Professional men do not agree to carry the case in their charge through to a successful issue in spite of all contingencies; physicians and attorneys are not considered warrantors; nor should a dentist be considered as a warrantor of his work—he never impliedly stipulates for success at all events. The reason of this rule has been clearly stated as follows: "Where the result desired, as the cure in the case before us, depends both upon the skill in the use of means, and the influence of other causes, the law raises no such implied engagement; it regards the undertaking to be only for the use of proper means. The retainer of a lawyer obliges him to the right conduct of the suit, but not for the judgment of the court, for that is beyond his control. The retainer of a physician obliges him to the employment of ordinary medical skill in the treatment of the patient, the cure is not with him. The husbandman employed to cultivate a field is not supposed to engage for the production of an average crop; he may plough and sow, plant and water, but the increase is not with him. The surgeon called to attend a patient with a broken or dislocated limb impliedly engages the ordinary skill of his profession in adjusting it; he is not supposed to engage to cure or to insure a recovery*."

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*Bouvier, Institutes, §. 1005.

†Carpenter v. Blake 10 Hun, 358.

Undoubtedly by an express contract to that effect a dentist may warrant the success of his work; in such a case the exercise of the utmost diligence and skill will not excuse him should the result be unfortunate, because it was his own fault or inexcusable ignorance that so uncertain a result should have been guaranteed successful.

The advantages which a profession confers are always accompanied with certain responsibilities and one who publicly announces himself a dentist takes the title *cum onere.* For any injury, therefore, to the patient arising from a failure on part of the dentist to perform the duties which he assumes by his contract he may be held accountable to the former in an action for malpractice. Obviously the wrongs which he may commit in the course of his practice, and which constitute the essential varieties of malpractice, may be included under two heads; first, malpractice from want of a reasonable degree of skill and learning, and; second, malpractice by reason of negligence in the application of that skill and learning.

It may be said to begin with that the question of intention does not at all enter into the problem of a dentist's responsibility—we are speaking of his civil responsibility—nor will it afford any foundation for a plea in extenuation of malpractice. The world at large cannot be expected to enquire into the individual proficiency of every professional man; hence it presumes him to be furnished with that amount of skill and learning which he is under obligation by virtue of his calling to possess. The want of ordinary skill and learning on part of a dentist is thus in itself a wrong against a person who employs him, for the reason that it is a breach of confidence and to that extent a fraud. Negligence, too, is as much a fraud upon a patient as want of skill and learning for it is in fact an omission to continue the use of the means most essential to produce the end contemplated by the contract, and thus, again, there is a breach of the confidence upon which the contract reposes†.

How far a dentist may be held responsible for an error of judgment has not, as far as we know, been judicially determined. Following the analogy of the other learned professions the general rule would seem to be that he is not answerable for an error of judgment in cases of reasonable doubt and uncertainty. In a case where the law upon this subject in reference to attorneys was discussed the court observes: It has been said that it will not be sufficient for a professional man to say that he acted to the best of his abilities because he should have formed a more just estimate of his own capacity before he engaged himself. This doctrine, if sound, would make an attorney responsible for every error of judgment, no matter what care or attention he exercised in forming his opinion. It would make him liable in all cases where the wisdom or legality of one or more alternatives was presented for his consideration, no matter how difficult the subject. But where a person who is appointed an attorney has the qualification necessary for the discharge of the ordinary duties of the trust imposed, we are of the opinion that the occurrence of difficulties in the exercise of it, which offer only a choice of measures, the adoption of a course from which loss ensues, cannot make the agent responsible, if the error was one into which a prudent man might have fallen. The contrary doctrine seems to suppose the possession and require the exercise of perfect wisdom, in fallible beings. No man would undertake to render a service to another under such conditions.* In another case it is said of physicians and surgeons: "To charge them with damages on the grounds of unskillful or negligent treatment of his patient's case it is never enough to show that he has not treated his patient in that manner nor used those measures which in the opinion of others, even medical men, the case required; because such evidence only tends to prove error of judgment for which he is not responsible."†

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*Gallagher v. Thompson, Wright, Oh. Rep. 466.

†Ordronaux, Jurisprudence of Medicine, c. IV.

Yet, like a physician, a dentist cannot interpose his judgment contrary to what has become a settled practice. It is dangerous to try a new instrument or *modus operandi* for the first time. Two surgeons once used a new instrument on the leg of a patient which had been broken, for the purpose of lengthening and strengthening it. In an action for malpractice which was afterwards brought against the surgeons the court, in its opinion, made the following comment upon this fact: "For anything that appears to the court, this was the first experiment made with this new instrument; and, if it was, it was a rash action, and he who acts rashly acts ignorantly; and, although the defendants in general may be as skillful in their respective professions as any two gentlemen in England, yet the court cannot help saying that, in this particular case, they have acted ignorantly and unskillfully, contrary to the known rule and usage of surgeons."‡

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*Percy v. Millavdon, 10 Mart., 36.

†Leighton v. Sargent, 7 Foster, N. H., 475.

‡Slater v. Baker, 2 Wils., 359.

What will constitute such a want of skill and learning, and such negligence in the application of that skill and learning as to make a dentist answerable in damages, it is not easy to define, as there is no absolute criterion by which the question can be determined ; all we can say is that it varies with circumstances. Take the case of Simons v. Henry,* for instance. Here the plaintiff furnished the defendant with a set of artificial teeth. The defendant refused to pay for them, on the ground that they felt odd and pained her, and was thereupon sued by the dentist. Upon the trial there was conflicting evidence as to whether the teeth fitted; by one it was testified that they were a good piece of work ; by another, that they were a fair, average piece of work; and by a third, that they were nothing extra. The judge instructed the jury that if the plaintiff had used all the knowledge and skill to which the art had at that time advanced, that was all that could be required of him. The Appellate Court granted a new trial, upon the ground that the instruction given required too much of the plaintiff. "If so much could be required of him, then every professional man would be bound to possess the highest attainments and exercise the greatest skill in his profession. Such a requirement would be unreasonable."

Now, take the case of Keily v. Colton.† The defendants undertook to extract a tooth while their patient was under the influence of laughing gas. In extracting the tooth the forceps slipped, and part of the tooth went down the plaintiff's throat, causing coughing and vomiting, which continued at intervals for about four weeks. Under the circumstances the court was of opinion that the defendants were bound to use extraordinary care. "They knew that the plaintiff, while under the influence of the anæsthetic, had no control of his faculties; that they were powerless to act, and that he was unable to exercise the slightest effort to protect himself from any of the probable or possible consequences of the operation they had undertaken to perform. He was in their charge and under their control to such an extent that they were required to exercise the highest professional skill and diligence to avoid every possible danger, for the law imposes duties upon men according to the circumstances in which they are called upon to act."

These two cases are consistent with each other, and both are consistent with the general rule. "Different things," says Judge Story, "may require very different degrees of care. The care required in building a common doorway is quite different from that required in raising a marble pillar, although both may come under the description of ordinary care."*

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*39 Me., 155.

†1 City Ct. Rep., 439.

Simons v. Henry illustrates how the standard of skill and diligence may vary with the nature of the work required to be done, while Keily v. Colton illustrates how it may vary according to the condition of the patient.

The standard of skill may vary also according to locality. In large cities and towns are always found dentists of the greatest degree of skill and learning in the line of their calling. Their pretensions are properly large, and they are to be held to a correspondingly high degree of responsibility; they contract to do more than the ordinary dentist, and they are to be paid a higher price for what they do; consequently, their contract is more difficult to fulfill. In the smaller towns and country those who practice dentistry, though often possessing a thorough theoretical knowledge of the highest elements of their profession, do not enjoy as great opportunities for daily observation and practical operations; they should not, therefore, be expected to exercise that high degree of skill and practical knowledge possessed by those having greater facilities than themselves†.

Upon the whole subject generally the very favorable rule has been laid down that, "the least amount of skill with which a fair proportion of the practitioners of a given locality are endowed is the criterion by which to judge of a professional man's ability or skill."‡

Ordronaux states the rule thus: "In order, therefore, to recognize, under an enlightened administration of laws, the essential doctrine of distinctions of rank founded upon superiority of mind, obtaining as well in the medical as in other professions, and to provide at the same time for the universal wants of society, it has been finally determined to consider the least amount of skill compatible with a scientific knowledge of the healing;" and we may add the dental "art as sufficient to predicate the existence of ordinary skill."§

In proof of this degree of attainment, a diploma is the best evidence; but to be valid, it must be proved that the college or society from which it emanated had corporate authority to grant degrees in dentistry at the date of giving the degree, and, if the college or society of another State, its act of incorporation must be offered as proof of its authority to grant such a degree. In proof that he actually did use due skill in the treatment of a case, a dentist may introduce evidence as to his general reputation for skillfulness, for, if he shows he possesses it, the presumption will be that he used it.

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*Bailments, § 420.

†Elwell, Malpractice, 23.

‡McClelland, Civil Malpractice, 19.

§Jurisprudence of Medicine, 25.

To make a dentist liable for malpractice, it is further necessary to show that his want of skill and negligence stand in immediate causal relation to the injury alleged to have been done, for he is bound to look only to the natural and probable effects of his treatment. Upon this point Bogle v. Winslow* is the leading case. The plaintiff, who was employed on one of the street railways in Philadelphia, was thrown from his car, his head striking a tree-box as he fell. When picked up he was insensible, and remained in that condition for nearly two hours; then he returned to his home, and next day to his work. Nearly a year later he went to Dr. Winslow's office with the express purpose of having some teeth extracted under the influence of chloroform. The chloroform was administered, but did not operate as soon as usual, exciting rather than quieting the patient. When insensibility was obtained the operation was performed, the chloroform being administered from time to time on symptoms of returning consciousness. While Bogle was walking home soon after this he complained of dizziness and of a tendency to totter; next day thickness of speech and partial paralysis supervened. From this he was still suffering, when a jury were called upon to say whether his condition was due to the want of skill and neglect of the dentist. The judge told them that if any doubts existed in their minds as to the safety of the agent employed, there was still a consideration of the highest importance which they ought not disregard. "All science," he said, "is the result of a voyage of exploration, and the science of medicine can hardly be said to have yet reached the shore. Men must be guided, therefore, by what is probably true, and are not responsible for their ignorance of the absolute truth which is not known. If a medical practitioner resorts to the acknowledged sources of information—if he sits at the feet of masters of high reputation, and does as they have taught him, he has done his duty, and should not be answerable for the evils that may result from errors in the instruction which he has received. He who acts according to the best known authority is a skillful practitioner, although that authority should lead him in some respects wrong; he will have done all that can be done, all that is given man to do, and may leave the result, without self-reproach, to a higher power. If the plaintiff was, from previous circumstances, predisposed to paralysis, it might happen that the extraction of his teeth without chloroform would bring on a paralytic attack. Even if this was the case, still it would not be just to make the defendant answerablr for consequences which he could not foresee, which were not the ordinary results of what he did. He was only bound to look to what was natural and probable—to what might be reasonably anticipated. Unless such a guard is thrown around the physician his judgment may be clouded or his confidence shaken by the dread of responsibility at those critical moments when it is all important that he should retain the free and undisturbed enjoyment of his faculties, in order to use them for the benefit of his patients."

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* 5 Phila. (Pa.) Rep., 136.

If the evidence in an action of malpractice against a dentist shows that the patient himself has been in any way guilty of negligence contributing to the injury complained of, there can be no recovery. Nothing can be clearer than that it is the duty of a patient to co-operate with his professional adviser; but if he will not, or under the pressure of circumstances cannot, his neglect is his own wrong or misfortune. No man can take advantage of his own wrong or charge his misfortune to the account of another*. The general doctrine of contributory negligence as applied to dentists is this: If the patient by the exercise of ordinary and reasonable care could have avoided the consequences of the dentist's negligence, then he is not entitled to recover; on the other hand, if by the exercise of ordinary and reasonable care he could not have avoided the consequence of the dentist's negligence, then he can recover.

In the recent case of the Richmond Tooth Crown Company v. Pommer†, the doctrine of contributory negligence is well illustrated. Dr. Sheffield, for the company, had placed in the mouth of the defendant a certain operation known in the profession as crown and bridge work. Mrs. Pommer not having paid the company's bill, an action was brought against her to recover the amount. She set up in her answer that there had been gross malpractice in performing the operation; that she had suffered greatly therefrom, and that her jaw had been severely injured and distorted. On the trial it appeared that these dentures when first put in might cause some pain and that they, as other artificial teeth, require adaptation to the mouth of the wearer and further, that it was proper and usual for the patient to return and have this done; that this patient, though she had an appointment for this purpose, had not done so, but after delaying some time had gone to another dentist or a physician and had the original operation removed. The defendant had not only refused to pay the bill, but had demanded large damages for her suffering and the injury alleged to have been done her jaw. Upon these facts the judge substantially charged the jury as law, that if, in their opinion, the defendant had by her failure to return to the plaintiff and permit the proper adjustment of the operation, materially contributed to the injury complained of, she was guilty of contributory negligence and could not recover. The jury returned a verdict for the company.

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*McCandless v. McWha, 22 Pa. St., 261.

†Not reported.

The mere fact of that a dentist renders his services gratuitously does not excuse him from performing his work with the same degree of skill and diligence as if he were acting under the incentive of a consideration or a prospective reward. It is not the consideration which constitutes the foundation of his responsibility, but the fact of his voluntarily accepting the trust; the *maxim spondet peritiam artis* applies indiscriminately to all. He cannot, therefore, apportion his skill or diligence to meet the emoluments flowing out of any given case*.

The burden of proof in an action against a dentist for malpractice is on the plaintiff; he must prove the negligence charged, including the defendant's want of skill and knowledge where that is relied upon, the proximity of the injury, and the absence of contributory negligence on his part.

These are all questions of fact for the determination of the jury, but the rule is imperative that the court should not submit the case to the jury unless the evidence in its opinion is such that from it malpractice may be reasonably inferred.

The amount of damages recoverable for injury arising from malpractice rests to a great extent in the discretion of the jury and must of necessity be more or less uncertain. In estimating the amount of damages to be awarded the jury may take into account the bodily pain and suffering, and loss of time caused the patient by the injury, the expense incurred, and the effect, whether temporary or permanent upon his capacity to pursue his customary work. If the damages awarded are so excessive as to strike everyone with their enormity and injustice and are such as to induce the court to believe that the jury must have acted from prejudice, partiality or corruption, the verdict will be set aside.

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*Ordronaux, Jurisp. of Med., 50.

A curious and interesting discussion has arisen as to whether, in view of the statutory exemption from levy and sale by virtue of an execution, a dentist's implements are to be considered as the tools of a mechanic or the instruments of a professional man; in this State the former to the value of $25, and the latter to the value of $250, are exempt.

In Maxon v. Perrott* the Supreme Court of Michigan decided that a dentist is a mechanic within the meaning of their statute. In that case the court observed: A dentist is in one sense a professional man, but, in another sense, his calling is mainly mechanical and the tools which he employs are used in mechanical operations. Indeed dentistry was formerly purely mechanical and instruction in it scarcely went beyond manual dexterity; and a knowledge of the human system generally and of the diseases which might affect the teeth and render an operation important was by no means considered necessary. Of late, however, as the physiology of the human system became better understood and the relations of the various parts and their mutual dependence became more clearly recognized, dentistry has made great progress as a science and its practitioners with much justice claim to be classed among the learned professions. It is, nevertheless, true that the operations of the dentist are still for the most part mechanical, and, so far as tools are employed, they are purely so; and we cannot exclude these tools from the exemption which the statute makes without confining the construction of the statute within limits not justified by the words employed.

On the other hand in Whitcomb v. Reid†—a Mississippi case—the court said: A dentist cannot properly be denominated a mechanic. It is true that the practice of his art requires the use of instruments for manual operation, but it also involves a knowledge of the physiology of the teeth which cannot be acquired but by a proper course of study; and this is taught by learned teachers upon the subject and as a distinct though limited department of the medical art in institutions established for the purpose. It requires true science and skill, and, if such persons could be included in the denomination of mechanics because their pursuit requires the use of mechanical instruments and skill in manual operations, the same reason would include general surgeons under the same denomination, because the practice of their profession depends in a great degree upon similar instruments and operative skill. Nor could such a pursuit properly be said to be a trade.

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*17 Mich. 332.

†31 Miss. 567.

The latter view has been received with more favor than the former and to us is manifestly correct*.

Fulfillment of the statute requiring a dentist to have a diploma or certificate of qualification from the State Dental Society, or from the faculty of a dental or medical college, recognized as of reputable standing by the State Dental Society, is undoubtedly a condition precedent to his right to recover compensation upon contract, express or implied, for services rendered by him in a professional capacity.

Subject to this statutory enactment, a dentist is entitled to recover from a patient for his services an amount fixed by an expresss contract, if there is one; and if there is no express contract, or if there is one which is silent or indefinite in regard to compensation, he may recover a reasonable compensation for his services, for it is a principle well established that, when one has used his skill and labor for the benefit of another, the law raises an implied promise on the part of the latter to remunerate the former as he deserves.

As to the amount of benefit which must have accrued to his patient to entitle a dentist to recover for services rendered, the rule is that if there has been no beneficial service, there shall be no pay; but, if some benefit has been derived, though not to the extent expected, this shall go to the amount of the plaintiff's demands, leaving defendant to his action for negligence†.

If the good effects of his treatment, and the consequent value of his services are disputed, he must be prepared to show that his labor was performed with the ordinary skill and diligence and in the ordinary way of his profession. In a case‡ where the plaintiff sued to recover for work and labor done, one of the judges said: "I think that in either case the plaintiff must be prepared to show that his work was properly done—if that be disputed—in order to prove that he is entitled to his reward; otherwise he has not performed that which he undertook to do, and the consideration fails. And I think it is competent for the defendant to enter into such a defence as well where the agreement is to do the work for such a sum as where it is general to do such a work. If a man contracted with another to build a house for him for a certain sum, it surely would not be sufficient to show that he had put together such a quantity of brick and timber in the shape of a house if it could be shown that it fell down the next day, but he ought to be prepared to show that he had done the stipulated work according to his contract. And it is open to the defendant to prove that it was executed in such a manner as to be of no value at all to him, or not to be of the value claimed." If, for instance, a dentist administers chloroform to a patient and then extracts the wrong tooth, he cannot recover for his services; nor can he, if his bill has been increased by his own mistake, as when, being employed to extract a tooth and insert an artificial one in its place, extracts two and has to insert two, recover for this additional amount of work. Lord Kenyon thus states the law applicable to this point: "If a man is sent for to extract a thorn which might be pulled out with a pair of nippers, and through his misconduct it becomes necessary to amputate the limb, shall it be said that he may come into a court of justice and recover a fee for the cure of the wound which he himself caused?"*

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*18 Alb. L. J. 384.

†Ord. Jurisp. of Med., § 37.

‡Basten v. Butter, 7 East, 479.

The law places no limitation upon the fees of professional men other than that they be reasonable. Within this rule a practitioner is allowed certain discretionary powers, and may charge more or less, according to his own estimate of the value of his services. A dentist of great eminence may be considered reasonably entitled to a larger fee than one less eminent, especially after it has become publicly understood that he expects a larger fee, as the party employing him must be taken to have employed him with a knowledge of this circumstance†. Custom, the character of the service, the estate of the patient, are other considerations which may be considered by a dentist in determining his charges.

It is only when the charges are plainly unjust that a court will interfere to reduce them. "Though professional men," says a learned judge, "are entitled to a fair and liberal compensation for their assistance, there are certain claims which they affect to set up which, if unreasonable or improper, it is for the jury to control." Very recently, in New York city, a jury reduced a dentist's bill from $445 to $67. Among the items in the bill was a modest charge of $40 for repairing a bridge of his own making, and which, as it appeared in evidence upon the trial, had always given trouble.

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* Kannen v. McMullen, Peake's N. P. C., Vol. I, 83.

† Willcock's Medical Profession, 111.

In making out his bills a dentist should be as specific as possible in his charges. A gross claim of $13 for medicine and attendance, which a physician sought to enforce at law, has been held bad, because too loose to sustain an action*. But if payment of the bill is refused, he is not restricted to its items and precluded thereby from showing what his services were reasonably worth and recovering sums larger than those charged. Thus an attorney has been able to collect $500 for services for which he had only charged $150 in the bill he rendered his client and which the client had refused to pay. On the hearing before the Referee the defendant's counsel put in evidence the bill which had been sent him by the plaintiff, and contended that the plaintiff should recover only the sum therein specified; but the Referee decided otherwise, and the court affirmed his opinion, saying, in effect, that the plaintiff's own estimate of the value of his services contained in the bill he had rendered the defendant was high evidence against himself, but it was not in the nature of an estoppel to preclude the truth. Had the defendant paid the bill when it was rendered, it would have been an accord and satisfaction of the services, though less than their real value, but the defendant chose to litigate, and the question of value was thus opened to proof as a question of fact†.

Where no notice to the contrary is given, a dentist will be presumed to make similar charges for similar services and to adhere to what has been his customary price in his former treatment of a patient.

Artificial teeth are considered necessaries, and, for that reason, the husband is liable for payment when they have been furnished his wife, particularly if she retains them with his knowledge and he has ever given the dentist who supplied them reason to believe from previous conversations with him that she was authorized to contract for them‡.

So the filling of teeth for their preservation, to give relief from pain, and to prevent its recurrence is a necessary for which an infant is liable§.

In England it has been held that a contract to make a set of artificial teeth is a contract for the sale of goods, wares, and merchandise within the meaning of the 17th section of the Statute of Frauds, which provides that no contract for the sale of such things, if for the value of £10, or upwards, shall be valid unless there be a delivery and acceptance of the goods or a part thereof, or an ernest given in part payment, or some memorandum in writing of the contract signed by the party to be charged, or by an agent thereunto lawfully authorized. It appears that a lady had ordered two sets of artificial teeth, which were to be fitted to her mouth. When the teeth were ready the dentist wrote requesting an appointment for the purpose of fitting them; in reply he received the following note: "My Dear Sir, I regret after your kind effort to oblige me that my health will prevent my taking advantage of an early day. I fear I may not be able for some days. Yours, &c." Soon afterwards the patient died and the dentist sued her executors for 20 guineas, the agreed price, but failed to recover. The court held that as by the terms of the contract the teeth were to be fitted to the patient's mouth, and as this, through no default on her part, was never done, her executors were not liable for work and labor performed and materials supplied. Nor was the note considered a sufficient memorandum to satisfy the requirement of the Statute of Fraud. Counsel for the plaintiff argued that the deceased had contracted for the skill and labor of the dentist, and that the materials supplied were merely auxiliary to the work and labor done, but the court rejected the proposition that the value of the skill and labor as compared with that of the materials supplied is the true criterion by which to decide whether the contract be for work and labor or for the sale of a chattel, and said that "the case bore a strong resemblance to that of a tailor supplying a coat, the measurement of the mouth and the fitting of the teeth being analogous to the measurement and fitting of a garment."* The New York Statute of Frauds, which is very similar in its statement to the English statute, has received in this particular aspect a different interpretation; the rule here is, that when the thing bargained for is not *in esse* at the time of making the contract, could not then be delivered or accepted, but is afterwards to be constructed or manufactured, the contract is held to be one for work and labor; a dentist in this state, therefore, may maintain an action against his patient for the price of a set of artificial teeth, counting on his agreement with him as a contract for work and labor done and materials supplied.

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*Hughes v. Hampton, Const. Rep. (S. C.), 745.

†Williams v. Glenny, 16 N. Y., 389.

‡Gilman v. Andrus, 28 Vt. 241.

§Strong v. Foote, 42 Conn. 203.

Fraud on the part of a dentist will vitiate any contract he may make with a patient Some years ago one Simpson gave a bill of exchange for over £200 to one Davis, a dentist, the bargain being as was alleged by the latter, that he should during the former's whole life attend to his teeth, and supply him with new ones from time to time; he also alleged that the price of a set of teeth varied from £30 to £50. The body of the bill was in the dentist's handwriting; the only part, if any, in the handwriting of the patient, was the signature. It was said to have been given in the dentist's house without the presence of a third person. Simpson died before the bill become due and it did not appear that anyone had ever heard of it before his death; nor did it appear that the contract was in writing. Other circumstances connected with the case were, that after Simpson's death Davis spoke and wrote inaccurately upon the subject, and had placed the bill in the hands of a creditor of his own to put it in suit. Meanwhile Simpson's executors began a proceeding in equity for the purpose of impeaching the bill for fraud and praying that it might be delivered up to them. The Vice Chancellor thought that it was impossible for a reasonable being to draw any other reference from the materials before him than that the whole transaction was fraudulent and thereupon granted the relief prayed for*.

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*Lee v. Griffin, 1 E. B. & S. 272.

As the bailee for hire of labor and services has a lien on the chattels upon which his labor and services are performed, so a dentist may hold a set of artificial teeth made or repaired by him as security for his reasonable charges; this lien he will waive by parting with possession, or by entering into any contract inconsistent with its continuance, as, for instance, where he agrees to give credit for a stipulated time†.

To the partnership agreements which are formed between dentists the general law of partnership applies. No particular formality need be observed in the formation of a partnership; nor need the agreement be in writing‡. In the absence of evidence to the contrary the presumption is that partners are to share equally both in the profits and losses. Partners are trustees and agents for one another; in the former capacity they must exercise good faith; in the latter, their general authority to bind a copartner is limited to acts incidental to carrying on in the usual way the particular business in which the partnership is engaged. A partnership may be dissolved by mutual consent, or by the expiration of the time within which it was to continue; a wilful and continued neglect of business, immoral conduct materially affecting the business, gross misconduct in reference to partnership matters, or permanent physical incapacity are also grounds for dissolution. In Morgan vs. Schuyler* is an instructive discussion as to the right to use the firm name after dissolution. The parties to this suit practiced dentistry under the firm name of "Morgan & Schuyler" in the City of Rochester. Having dissolved by mutual consent the defendant purchased certain partnership property, assumed the rent of and continued to occupy the rooms of the late firm. It was understood that the plaintiff was to open another office in the same City and this he did. After the dissolution the plaintiff caused his name to be removed from the sign containing the firm name, but the defendant replaced it as nearly as possible as before and then placed over the firm name upon the sign the following: "B. F. Schuyler, Successor to," in letters so small and in such a way as to be nearly imperceptible. This action was thereupon brought to restrain the defendant from using the plaintiff's name upon signs, circulars, or advertisements, or from declaring himself to be the successor of the late firm of Morgan & Schuyler. A judgment was directed granting the plaintiff the relief sought, and a reference was also directed to ascertain his damages. This judgment was sustained by the Court of Appeals. Judge Danforth in giving the opinion of that Court said : There was nothing in the former relations of the parties, or the express terms of the agreement of dissolution, which gave to either one the good will of the business theretofore conducted by them under the firm name of "Morgan & Schuyler," nor was either in any way restrained from continuing the practice of his profession on his own account in any place. Yet the defendant became the equitable assignee ot the unexpired term of the lease under which the firm held its place of business, and the sole owner of certain partnership property and fixtures. He thereby acquired an advantage over the plaintiff, for he had the exclusive right to occupy the rooms of the late firm, and as incident thereto, the benefit of that good will, which Lord Eldon defines, "as the probability that the old customers will resort to the old place." The extent of this depends partly upon the force of habit, and in the case of such business as had been carried on by these parties in some degree upon the satisfaction which the patient had received at the hands of one or the other member of the firm, but it is after all a very different thing from the good will which may be said to attach to the person of a professional man, as the result of confidence in his skill and ability. The first is of no value except to the occupant of the place, while the latter is inseparable from the person, and follows its possessor wherever he goes. So far as it belonged to the plaintiff, it could not have been transferred to the defendant, but the advantage secured to him as the occupant of the old place of business, would doubtless have been rendered more valuable if the plaintiff had retired, not only from the firm, but from the practice of his art. This, however, he not only did not undertake to do, but it was understood by both parties at the time of dissolution that the plaintiff was at once to open an office, and carry on his business of dentistry, in the same city. This fact precludes the idea that the defendant acquired any good will in the business, except such as was incident to his sole ownership of the property, mentioned in the agreement. It is evident, therefore, that it was not the intention of the parties that the defendant should in the conduct of his business, in any manner use the plaintiff's name either in combination with his own, as "Morgan & Schuyler," or in subservience to it, by declaring himself "the successor" to that firm. It is not claimed that there is any express contract to that effect, and none can be implied, either from the language of the agreement actually made, or from any fact or circumstance connected with it. * * * * Nor has the defendant any better right to declare himself the "successor" of the firm of "Morgan & Schuyler." In so doing he represents not only that the firm is extinguished, but that his co-member has quit, or retired from business. The latter therefore will lose the patronage to which he is entitled, for those persons who might otherwise resort to him for assistance will be misled into supposing that his services cannot be obtained. In either aspect the plaintiff's case was made out. It does not follow, however, that the defendant may not avail himself of the full value of his purchase, and to that end by signs and advertisements refresh the memory of those customers who had acquired a preference for the particular locality in which he continues business, or recall to their attention the circumstance to which that performance might be due. He may lawfully describe the rooms as "formerly occupied by Morgan & Schuyler," and himself as "formerly" or "late" of that firm, by these or other phrases. He would thus state simply facts, belonging to his own life, or incident to the office, as much so as the time or place of his birth, the name of his father, or instructor, the college from which he graduated, or the time when the premises were first used in the practice of his calling. All this might be done in good faith."

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*Allen v. Davis, 4 DeG. & Smale. 133.

†Edwards On Bailments, §§ 420–425.

‡Participation in the profits of a business, as compensation for services, will not constitute a partnership.

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*79 N. Y. 490.

The relations of dentists to their assistants are, as a general rule, governed by the ordinary law of master and servant, but in all such engagements the custom of the profession, unless excluded expressly or by implication, is admissable in evidence to explain, or annex incidents to the contract, as, for instance, to prove that it may be put an end to by notice.

A dentist is liable on all contracts entered into by his assistant where he has given him express or implied authority to make such contracts; thus where an assistant usually orders drugs on credit and the dentist usually pays for them, the dentist will be held liable to pay for any goods of a similar nature which the assistant may obtain on credit for his own use.* And he will also be held liable to an action for damages for an injury which his assistant acting within the scope of his employment, does a patient through want of proper skill.† On the other hand, a dentist may recover for the services rendered by his assistant, and this even though the assistant has not fulfilled the statutory requirements.‡ An assistant when he begins practice for himself will not be allowed to imitate too closely the cards and signs of his former employer. The leading case on this point is Colton vs. Thomas§; in that case the facts were briefly as follows: The plaintiff purchased of Dr. Gardner T. Colton of New York the right to use the name "Colton Dental Association" in connection with the use of nitrous oxide gas to aleviate pain in the extraction of teeth, and commenced practice in the city of Philadelphia under the designation of the "Colton Dental Association." When the defendant, who had been in his employment, opened dental rooms for himself he issued cards and put out signs very similar to those used by Dr. Colton, with the addition, however, of the words "formerly operator at," in very small and almost illegible letters. The Court restrained the defendant from using the cards and signs complained against on the ground that such use was a fraud upon the public; and it also restrained the employment by the defendant of any device by which the patients and the patrons of the plaintiff without the exercise of excessive care would be induced to suppose that the defendant's place of business was the place of business of the "Colton Dental Association."

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*Nickson v. Brohan, 10 Mod. 109.

†Hancke v. Hooper, 7 C. & P. 81.

‡People v. Monroe, 4 Wend. 200.

§2 Brews. 308.

Dentists often have occasion to make what in law are known as contracts in restraint of trade with partners or assistants on the determination of the relation between them. As a general rule contracts in restraint of trade are void as against public policy; yet when the conditions prescribed are confined within certain limitations they are valid. The requisites which are essential to the validity of contracts of this nature are; first, that the restraint be partial; second, that it be reasonable; and, third, that there be a good consideration. In Horner vs. Graves* the plaintiff who was a surgeon dentist entered into a contract with the defendant by which the former agreed to employ the latter, paying him for his services, for the term of five years, and in addition thereto that he would instruct him the profession of a surgeon dentist. On the part of the defendant it was agreed, among other things, that he would well and faithfully serve the plaintiff as his assistant and that he would not at the expiration or sooner determination of the said term of five years, provided the plaintiff was then living and practicing his profession, practice as a surgeon dentist at or within one hundred miles of the City of York without the plaintiff's previous consent in writing under a penalty of £1,000. The defendant violated the latter term of agreement and thereafter the plaintiff brought this suit to recover the penalty. Counsel for the defendant contended that this contract was void on the ground that the restraint was unreasonable and the consideration inadequate. Upon the question whether the restraint was reasonable or not the Court said: "We do not see how a better test can be applied to the question whether reasonable or not, than by considering whether the restraint is such only as to afford a fair protection to the interest of the party in favor of whom it is given, and not so large as to interfere with the interests of the public. Whatever restraint is larger than the necessary protection of the party can be of no benefit to either, it can only be oppressive; and if oppressive, it is in the eyes of the law unreasonable. Upon the true inspection of this it must strike the mind of any man that a circle round York traced with a radius of one hundred miles encloses a much larger space than can be necessary for the plaintiff's protection. The nature of the occupation, which is one that requires the personal presence of the practitioner and the patient together at the same place, shows at once that the plaintiff has shut out the defendant from a much wider field than can by any possibility be occupied beneficially by himself." Upon the question of the adequacy of consideration the Court further said: "It must be confessed it is very small compared with the restraint under which the defendant consents to place himself. * * * At the time of entering into this contract he was at liberty to set up his claim and endeavor to gain his livelihood in the City of York. But under the present contract, after being employed by the plaintiff for three months only and receiving in consequence no more than the sum of £30 he was liable to be prevented from carrying on his business and earning his livelihood within the space comprehended within a circle drawn with a radius of one hundred miles from the City of York. Surely this appears a very slender and inadequate consideration for such a sacrifice." Cook vs. Johnson* illustrates a valid contract in restraint of trade. Here the defendant sold to the plaintiff his dental business and agreed for the sum of $100 not to practice dentistry within a radius of ten miles from Litchfield. There was no limitation whatever in regard to the time during which the restraint was to continue, but in the opinion of the Court such a limitation under the circumstances was not required, for the reason that there is a well settled distinction between a general restriction as to place, and a general restriction as to time. The mere fact that the duration of the restriction as to time is indefinite or perpetual will not of itself avoid the contract if it is limited as to place and is reasonable and proper in all other respects.

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*1 Bing. 735.

Gentlemen: If I have said anything which has been of interest to you, if I have said anything which may be of use to you in the practice of your profession, I shall feel deeply gratified, amply repaid for my labor.

FUNCTIONS OF THE THYROID GLAND.

From the results of numerous cases of removal of this body in connection with the physiological functions, as demonstrated by Albertoni and Fizzoni, it is probable that the vexed question as to the use of this organ is now settled. The above named gentlemen believe that they have discovered the real function of this gland, and after a careful study of the blood of animals deprived of this gland, have come to the conclusion that it gives to hæmaglobin the faculty of absorbing oxygen. The fact is that the blood of animals which have been deprived of the thyroid gland contains a very small proportion of oxygen; their arterial blood contains less of this gas than the venous blood of healthy ones; and the investigators ascribe the symptoms of acute cachexia strumipriva in dogs to this very considerable diminution of oxygen which always followed upon enucleation of the gland.—*Indiana Medical Journal.*

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*47 Conn. 175.

A COURSE IN ANIMAL HISTOLOGY.

BY THOMAS G. LEE, M. D.,
Lecture in Normal Histology, Medical Department Yale University.

(CONTINUED.)

PART III.

BLOOD.

(*a*) A frog is exceedingly well adapted for the study of the nucleated red blood corpuscles. Wipe dry the leg of a frog and cut off a toe; strip the leg downward and place a drop of the blood and lymph on a clean slide; quickly cover if the slide is to be examined for a considerable time, and is a good one. A ring of oil should be painted around the edge of the cover glass to prevent drying. Note the oval red corpuscles with their large nuclei, also the white, some of which are more granular than the others.

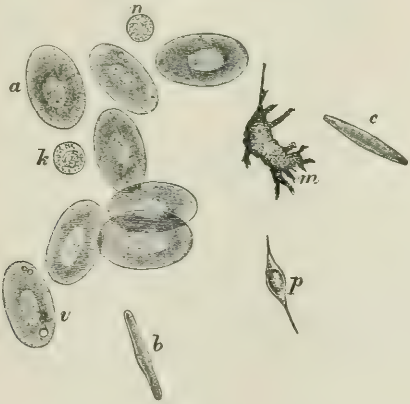

FIG. 3.

Frogs Blood.—*a*, red corpuscle, flat; *b*, same on edge; *n*, *m*, white corpuscles.

(*b*) Make a similar preparation of human blood by pricking the finger with a fine needle and pressing out a drop of blood; note the round biconcave red corpuscles.

(*c*) To show amœboid movement a warm stage is needed. A simple one can be made by cutting a piece of copper in the shape of a T, the end being the size of a slide with a hole in the center to let the light pass through, and the arm three to four inches long. Prepare a slide of blood as in (*a*) and place it on the copper plate and the whole on the microscope stage; heat the projecting arm with an alcohol lamp, avoiding over heating. Having brought a white corpuscle into the field, watch it, and presently, if the temperature is right, the corpuscle will be seen to send out pseudopods and to exhibit amœboid movements (See **Amœba**). It has quite similar properties to the low organisms of life, and in the space of a few moments the corpuscle will be seen to have successively assumed a great variety of forms.

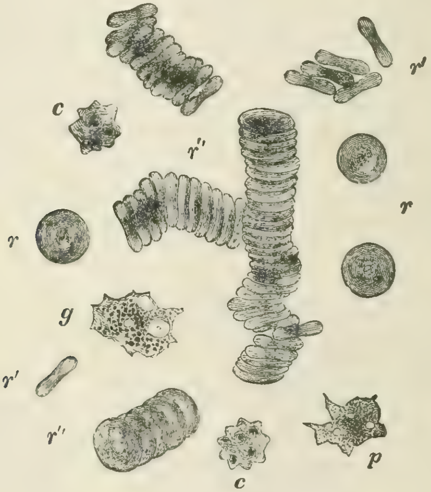

FIG. 4.

Human Blood.—*r*, red corpuscles on flat surface; *r'*, red corpuscles on edge; *r''*, red corpuscles in rouleaux; *c*, red corpuscles, crenated; *g*, white corpuscle with nucleus and vacuoles; *p*, white corpuscle; both are granular and undergoing amœboid movement.

(*d*) Rub a little vermilin in some ¾ per cent. salt solution, add a drop of this to the blood and proceed as in (*c*), and the white corpuscles will be seen to absorb particles of the pigment.

(*e*) Effect of reagents.—Prepare a slide of blood, but do not put any ring of oil around; focus on it under the microscope, then add a drop of the fluid to be used on the slide at one side of the cover glass, and a piece of bibulous paper on the opposite side; by this means the fluid is drawn through the specimen while the changes are being observed under the microscope—water, dilute acetic acid, a 2 per cent solution of boracic and tannic acids, etc.

(*f*) To stain blood corpuscles for permanent preparations.—Place a drop of fresh blood on the slide near one end and draw the edge of another slide over it so as to make a thin film over the slide; let this dry, then stain; or, better, spread a cover glass with a thin film of blood and expose it to the fumes of osmic acid, the crystals or a 1 per cent. solution, for a minute, then stain.

These preparations may be stained singly, or if nucleated, double stained. Hæmatoxylon stains the nuclei of red corpuscles and white corpuscles, and as eosin stains the stroma of the red, these can be used together in double staining. Picro-carmine stains nuclei red, stroma yellow. The anilines may be used singly or in combination. Mount in glycerine and seal.

The following method of Prof. Gage is a good one for double staining at the same time. Spread the cover glass with normal fluid, then with a film of blood, and fix over osmic acid vapor; place on the cover a drop of the stain, and gently apply to the slide, and seal.

To make the stain:

Glycerine - - - - - - -	85 c.c.
Gunacher's alum carmine - - -	10 c.c.
Fluorescine solution - - - - - -	5 c.c.

The fluorescine solution consists of

Fluorescine - - - - - -	$\frac{1}{10}$ gm.
Chloral hydrate - - - - -	2 gm.
Water - - - - - - -	100 c.c.

$\frac{1}{10}$ gm. of eosin may be substituted for the fluorescine.

White corpuscles in various stages of amœboid movement may be made by placing on warm stage, then quickly fixing with osmic acid vapor. Stain and seal.

(*g*) To prepare blood so that it may be kept in bulk for use. Let fresh blood fall drop by drop into a 1 per cent. solution of osmic acid, or into a mixture of $\frac{3}{4}$ per cent. salt solution 1 part, 1 per cent. osmic acid 2 parts; keep the fluid agitated while adding the blood, let stand for a day, then remove the acid by washing the sediment; may be stained and again washed and kept in glycerine, or treated with alcohol and kept in clove oil if it is preferred to mount in balsam (*h*) To study blood placques.—Place a drop of 1 per cent. osmic acid on the finger, which has been first carefully cleaned, and with a fine needle prick and mix in the drop of fluid; place a little of this on the slide, then cover and seal.

(*i*) Blood Crystals.—Hæmoglobin crystals are readily shown in the blood of a rat or guinea-pig by mixing a drop of fresh blood with a drop of water and covering quickly on a slide; they will crystalize out. Hæmin crystals show by mixing equal parts of finely pulverized salt and dried blood on a slide; cover and run underneath some glacial acetic acid; heat over an alcohol lamp till the acid begins to boil. The excess of acid may be washed out and the cover sealed.

160. The Blood consists of the plasma, a transparent coagulable fluid of a sp. gr. 1055, and the corpuscles. These are of two kinds, the red and the white corpuscles, besides which there are in most specimens minute granules known as blood placques, or the third corpuscle. The corpuscles form a little over one-third the bulk of the blood. In number they give about 5,000,000 to the cubic mm. Of these there are in health from 400 to 600 red to 1 white corpuscle.

161. Red Blood Corpuscles.—These are thin disks which are round, biconcave, and non-nucleated in the mammalia; oval, slightly biconvex, and nucleated in birds, reptiles, amphibians, and fishes, with the exceptions that in the camelidæ the red corpuscles are oval or regular in shape, and that some fishes have round corpuscles. Their substance of the corpuscle is a mass of protoplasm known as the stroma; this contains in it in solution a coloring matter, hæmoglobin, which gives to blood its color, the characteristic red color predominating. When blood is in mass, as when spread out in a thin layer, it has a yellow or greenish yellow appearance. The corpuscles vary wonderfully in size in various animals, ranging from those of the musk-deer .0025 mm. ($\frac{1}{12325}$ inch) to those of Ampheuma .077 mm. ($\frac{1}{325}$ inch) in diameter; the red corpuscle of man measures about .0077 mm. ($\frac{1}{3200}$ inch). If fresh blood be examined the red corpuscles will be seen to have a great tendency to adhere to each other by their flat surfaces, forming rolls. Scattered around the field between them will seen the white corpuscles, and as the blood coagulates or dries, delicate threads of fibrin will be seen which inclose the corpuscles in their meshes. On exposure to the air, or mixed with saline solutions, the red corpuscles lose their smooth outline and become crenated or notched; later they may become smaller in size and covered with spines so that they resemble a chestnut burr. The effect of treating blood with water, cold, heat, dilute acids, electricity, etc., is to drive out the hæmoglobin and the stroma swells up, becomes globular, and finally invisible, or at most, but a faint ring is seen some reagents, as tannic and boracic acids, cause the coloring matter to collect at one side of the corpuscle, or even protrude from its surface. The hæmoglobin will crystalize out in forms characteristic of it, and which vary in different animals.

162. White or Colorless Corpuscles.—These corpuscles are spherical in all animals, in man are about .01 mm. ($\frac{1}{2500}$ inch) in diameter, and about 10,000 to the cubic mm.; they consist of soft protoplasm with one to four nuclei; some are pale, others have a number of granules; they are not as heavy as the red corpuscles. The white corpuscles have the power of amœboid movement, which is characteristic of them (See **Amœba**). By means of this power they escape from the blood vessels and wander through the surrounding tissue. This power of amœboid movement is possessed by other cells in the body as well as the white corpuscle.

When treated with water the corpuscles swell up and the granules take on a vibrating motion known as the Brownian movement, the amœboid movement is lost, the nuclei are rendered more distinct, and finally the corpuscle bursts from the continued imbibition of water. Dilute acids, as acetic, cause a concentration of the granules about the nuclei, which are smaller and very prominent, the outside of the corpuscle being more or less clear.

163. The Third Corpuscle or Blood Placque.— In most specimens of blood, markedly in the rat, are to be found a number of small granules of smooth structurless protoplasm, non-nucleated and light gray in color; these usually are aggregated in little clumps or masses, and have been known as the granule masses of Max Schultze. These placques have been studied from time to time, and are now considered to be a constant element of the blood (*Osler*), numbering about 250,000 to the cubic mm., having a diameter of .0015—.0035 mm. ($\frac{1}{16000}$ — $\frac{1}{7000}$ inch).

164. Development of Blood Corpuscles.—The corpuscles are of mesoblastic origin in the embryo, and are nucleated amœboid cells; some of them become flattened and filled with hæmoglobin and become the red corpuscles. In adults the red corpuscles are found in the red marrow of bone and in the spleen, while the white are largely found in the lymphatic glands and lymphoid tissue.

165. Lymph.—This consists of a clean coagulable fluid containing colorless corpuscles very similar in size and appearance to the white blood corpuscles; they contain one to three nuclei, have amœboid movement, may be granular; red blood corpuscles and granules may also be seen sometimes in lymph.

EPITHELIUM.

(*a*) Squamus epithelium is very readily obtained by scraping scraping the tongue or inside of cheek with the nail, and putting a drop of saliva on the slide and covering. Note the flattened scales of epithelium. Salivary corpuscles will also be seen. These are white blood or lymph corpuscles which have become swollen with saliva and contain granules showing the Brownian motion.

(*b*) Keep a frog or newt in a dish of water for three or four days without change and in it will be seen a delicate membrane, which is a layer of epidermal cells from the surface of the animal. Wash this with slightly acidulated water and stain in hæmatoxylon. Note the polygonal cells and the stained oval nuclei, and the layer of unstained cement substance joining the cells. The nuclei often show nicely the intra-nuclear network.

(*c*) To see stratified pavement epithelium, cut a section from some portion covered with skin, the finger, stain and mount in balsam. Note the layers and the variation of the cell in the different layers.

(*d*) Columnar epithelium may be shown by hardening a bit of stomach or intestine in chromate of ammonium solution and staining with hæmatoxylon or carmine, scraping off a little of the cellular lining and teasing on a slide in a drop of glycerine. Cover and seal. Note the columnar cells, and also some of them becoming goblet cells.

(*e*) Ciliated epithelium is prepared by hardening a piece of trachea in a 2 per cent. solution of potassium bicarbonate, washing, staining with hæmatoxylon or carmine, teasing in glycerine and mounting. Note ciliated cells, also goblet cells.

(*f*) Scrape the inside of a frog's mouth gently, and tease a bit with the addition of a drop of ¾ per cent. salt solution; covering quickly. Note the motion of the cilia.

(*g*) Study transitional epithelium by making a teased preparation of the epithelial lining of the bladder, also cut and mount in balsam a section of the same.

(*h*) Glandular epithelium may be studied by making a teased preparation, and a section of some gland—liver, pancreas, etc.

(*i*) Karyokinesis.—Picric and chromic acids are among the best fixing agents. The chromic salts are condemned by Flemming, who prefers chromic acid and the chrom-aceto-osmic acid mixture. Sapanin, dahlia, gentian-violet, and hæmatoxylon are among the best stains.

166. Epithelium.—This is a tissue formed exclusively of nucleated cells, with a very thin layer of intracellular cement substance between. These cells are arranged in one or more layers and cover all the free surfaces of the body and mucus membranes, line the ducts and alveoli of secreting glands, and as a modified form constitute the hair, nails, enamel, crystaline lens, etc.

Epithelial cells have two sources of origin, epiblast and hypoblast. The epiblastic epithelium forms that of the epidermis and the sense organs, the glandular epithelium being largely hypoblastic in origin. Epithelial cells are of two principal types, columnar and flat or pavement. There are various forms of these two types; of the columnar we have short, long, cylindrical, prismatic, spindle or club-shaped; the flat may be polyhedral, cubical or scaly. These cells also vary greatly in size in different parts of the body, and also as to the number of layers. When arranged in one layer it is called a simple epithelium, stratified when there are several layers; there is also a form known as transitional. An epithelial cell consists of protoplasm and contains one or more nuclei and nucleoli, which may be round or oval, and the protoplasm clear or granular, this granular appearance being due largely to the intra-cellular network of fibers. The cells on free surfaces often have the protoplasm on their outer margin hardened into a delicate membrane. Epithelial cells multiply rapidly by indirect division, or karyokinesis, and as the nuclei are large and readily stained and examined, this tissue is one of the best places in which to study karyokinesis.

167. Karyokinesis.—As has been shown, this change is a nuclear one; the nucleus when not undergoing this change is said to to be in the resting condition. The first change is the disappearance of the nuclear membrane, the intra-nuclear fibers become more distinct because of their separating more from each other, also thickened, forming the stage of convolution or the skein. The fibers continue to separate and form loops around the center, giving the wreath or rosette stage. These loops now break on the outside and the ends separate into the form of a V, giving rise to the star or aster form, which in turn separates into two similar masses, the stage of double star or dyaster, and each of these stars goes back through these steps, becoming wreath, skein and finally enters the resting stage, etc. Continuous with these changes we have the drain of the contents.

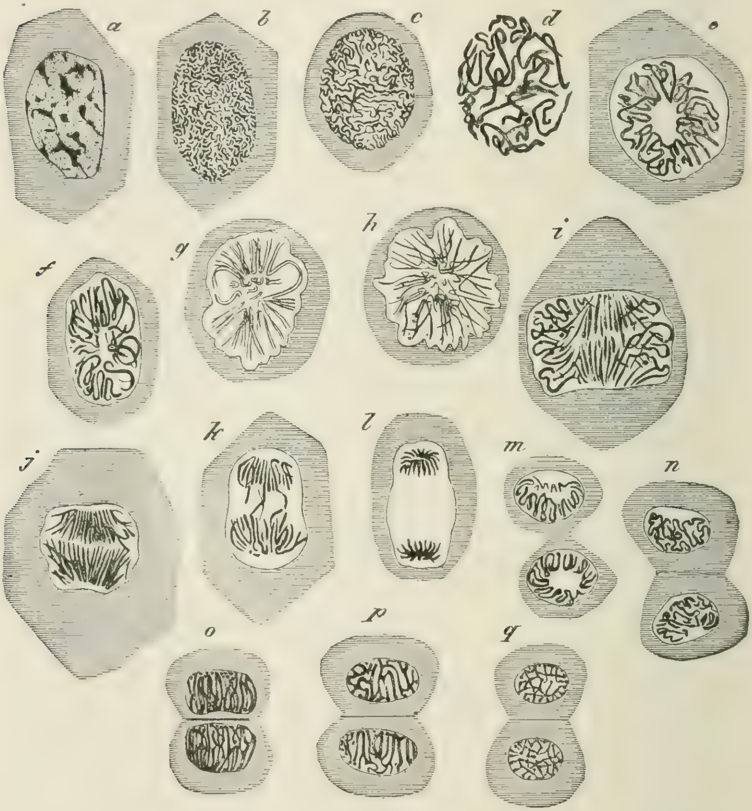

FIG. 5.

Epithelial Cells in process of indirect division.

These changes have been noted in vegetable as well as animal cells, and pathological as well as normal cells. The bladder epithelium of the frog and newt, and skin of tadpole, are good places to study these figures, but they have been seen in nearly every class of cell in the body.

168. Pavement Epithelium.—This form may be simple, a single layer of flattened cells, as seen in some of the renal tubules, in the inactive mammary gland, in air cells of the lung, and elsewhere; more often it is stratified as seen in the epidermis, cornea, cavity of the mouth, pharynx, vagina, etc. The outer cells are scaly, hard and hornlike; those underneath are more rounded and softer in consistency, and are the ones in which division takes place.

169. Columnar Epithelium.—The cells are usually cylindrical or prismatic columns, and resting on a delicate basement membrane; the outer surface is covered with a striated border, occurring as a simple columnar epithelium on the inner surface of the stomach, intestine, uterus, etc.; as a stratified epithelium in the larynx, trachea, etc., the lower layers being more or less conical or spindle shaped.

170. Ciliated Epithelium—Goblet Cells.—The columnar cells in certain positions have attached to their free extremity protoplasmic hairs or cilia, which are supposed to be continuations of the intra-cellular network. They have a constant wavelike motion, the direction varying according to the situation of the cells, which cells are found in the uterus, oviducts, trachea, etc.

The protoplasm of epithelial cells may undergo a mucoid change, and the remnant of the cell after the escape of the mucus resembles a goblet, hence the name; the nucleus is pushed down to the bottom of the goblet by the firmness of its fluid. When ciliated cells undergo this change the cilia are first lost.

171. Transitional Epithelium.—In the ureter, bladder, and pelvis of the kidney, is found a form of stratified cells consisting of three or four layers, and called transitional epithelium. The surface cells are large, flat, with one or two nuclei, and have on the under surface depressions in which fit the broad ends of a layer of club-shaped columnar cells. Between the lower ends of these club-shaped cells, and beneath them, are one or two layers of small cells.

Epithelial cells may be pigmented, as the layer outside of cells in the retina. In these cells the nuclei are not pigmented.

ENDOTHELIUM.

(*a*) Take a piece of fresh omentum of rabbit or other small animal and wash in distilled water, stain in silver nitrate, reduce in formic acid; mount a small piece in glycerine unstained, another piece stain in hæmatoxylon, and mount. These specimens will show the cement substance stained with the silver, and in the last will be seen the large oval nuclei stained blue. The endothelial cells will be seen, by focussing carefully, to have a different outline on the two sides of the membrane. Note also the capillary bloodvessels and lymphatics mapped out by the silver.

(*b*) Prepare in a similar manner the peritoneum of a frog, and note the lymph stomata surrounded by germinating endothelial cells.

172.—The term endothelium is given to the single layer of flat, nucleated cells, joined by cement substance, which form a continuous layer on the inside of all closed cavities,—serous and synovial membranes, sheaths of tendon, membranes of brain and cord, circulatory and lymphatic systems, etc. The cells are not all of the same embryonic origin, being partly epithelial, partly connective in their deviation. The cement substance joining these cells, when stained with nitrate of silver, shows the cells to vary in form in different places, the margins being in some cases quite sinuous or wavy; the cells are also quite elongated in some places. In the serous membranes are found openings or stomata for the passage of lymph, and these are surrounded often by a layer of more cubical cells, the germinating endothelium, and it is thought that these cells are one of the sources of origin of the white blood corpuscles.

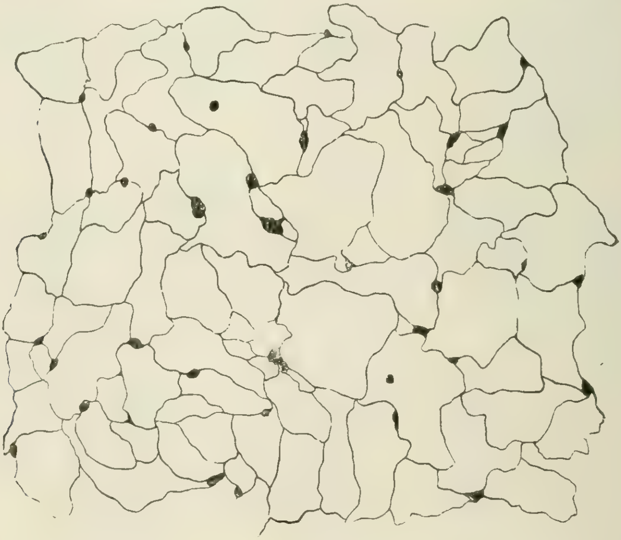

FIG. 6.

Endothelial Cells stained with silver nitrate.

CONNECTIVE TISSUES.

(*a*) Connective tissue corpuscles as seen in tendons may be prepared by separating the joints in the tail of a mouse or rat and pulling it forcibly; long delegate threads of tendon will remain, which should be cut off and placed in acidulated water, washed and stained in gold chloride, reduced with formic acid, teased and mounted in glycerine; the tendon cells will be seen lying in rows between the tendon fibræ bundles.

(*b*) Areolar tissue may be shown by injecting into the subcutaneous tissues of the groin of any young animal some fluid to produce an artificial œdæma. Picro- or alum-carmine may be used, or one of the aniline colors, or osmic acid, and the staining done later. In about an hour, with a sharp pin or scissors, snip out a bit of the mass and transfer it to a slide, spreading out carefully with needles. Mount in glycerine and seal.

(*c*) Tendon and white fibrous tissue are well shown in preparations of the tendo Achillis of some animal. Soak a bit of tendon in a saturated solution of picric acid for twenty-four hours and tease out the fibers; cut transverse and longitudinal sections of tendons and stain in hæmatoxylon.

(*d*) Elastic tissue may be studied in the ligamentum nuchæ of the ox or other animal. Tease up some of the fibers and note the curling of the ends. Cut longitudinal and transverse sections, then stain in picro-carmine.

(*e*) Adipose tissue is studied in sections of subcutaneous layers of skin, and in the omentum of young animals.

(*f*) Mucus tissue is found in the vitreous humor of eye, umbilical cord and young embryo. Make transverse sections of umbillcal cord; prepare loose tissue of embryo as in (*b*). Make transverse sections of a gland and stain in hæmatoxylon; shake briskly in a test tube with a little water and mount.

(*g*) Lymphatic tissue may be studied in the lymphatic glands.

173. **Connective Tissue** is a name given to the forms of supporting and connecting tissue of the body; these are met with everywhere in and about all organs, forming a network of tissue which is continuous throughout the body. The connective tissues are all of the same origin, from the mesoblast, and show in various

places a transition from one form into another. Connective tissue, whatever the form it takes, gives similar chemical reactions. The elements of connective tissue are the white fibers, the yellow or elastic fibers, and the connective tissue corpuscles, and the structures they compose may be considered under the head of Fibrous Connective Tissues, Cartilage and Bone.

174. **Connective Tissue Corpuscles.**—These are of two kinds, the fixed and the migratory. The migratory cells are amœboid protoplasmic cells, about the size of white blood corpuscles, and with one to three nuclei. These cells may pass through the blood vessel walls and wander about among the fibers of the loose tissues. There is another corpuscle larger than the one just mentioned, the plasma cell, which has slight amœboid movements. It is larger than the other, contains a single large nucleus, and is more or less granular. The pigmented connective corpuscles have also a slight amœboid power.

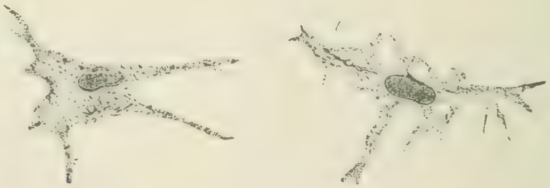

FIG. 7.

Branched Connective Tissue Corpuscles.

The fixed connective tissue corpuscles are flattened, branched nucleated cells, varying in shape and size considerably as to their situation in tendons and fibrous membranes. The cells are flattened plates placed often in rows, the sides or plates of the cell numbering three or four. In loose connective tissue there are found bipolar spindled-shaped cells with long branching processes which unite with those of other cells. These are flattened and have a large round nucleus, seen in the cornea and serous membranes

175. **White Fibrous Connective Tissue.**—This has a wide distribution in the body, being found in skin, mucus, serous and synovial membranes, tendons and their sheaths, capsules of organs, etc., and consists of minute bands or bundles of delicate homogenous fibrils, which fibrils are held together by a cement substance. These bundles are found in layers or in trabeculæ, the direction

varying; in tendons and fasciæ they are parallel, in membranes the trabeculæ cross and interlace repeatedly, forming a meshwork in some membranes, as the omentum; these are well defined openings or fenestræ. In the subcutaneous or muscular spaces the fibers are found to be much looser and more branching, and form what is called areolar or cellular tissue. This tissue is very widely distributed throughout the body, forming a continuous network everywhere. It holds together the ascini of glands, the bundles of muscle fibers, etc., and is the tissue in which we find the migratory connective tissue corpuscles. It is more compact in some places than others, and is moistened by a lymph fluid. White fibrous tissue fibers are very strong, and never branch, but take a nearly parallel course.

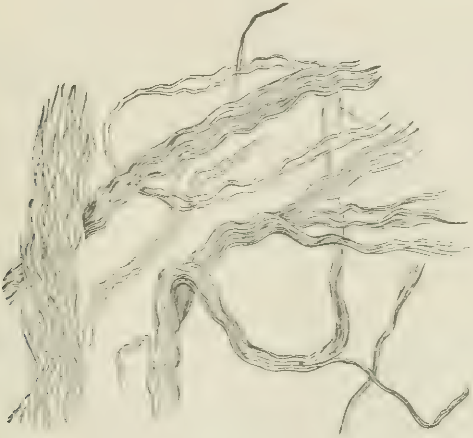

Fig. 8.

White Fibrous Tissue.

176. Yellow Elastic Connective Tissue.—In certain parts of the body is found a tissue composed of branching, very elastic fibers, as ligamentum nuchæ; these fibers seen singly are homogenous and colorless, often with fine transverse markings in places, but in mass they have a yellow color. The fibers have a marked tendency to curl when broken. These fibers are seen in the tissues just described; in membranes the elastic fibers are seen branching in different directions.

INTERNATIONAL MEDICAL CONGRESS.

SECTION ON DENTAL AND ORAL SURGERY.

President Jonathan Taft welcomed those present.

Drs. Metnitz, of Austria, McLeod, of Scotland, and Greverts, of Holland, replied in behalf of their respective countries.

The President then delivered his address, in which he reviewed the progress of dentistry in the last fifty years. He urged the profession, through those present, to work in all earnest for a yet higher standard.

Dr. Porre, of Cincinnati, O., read a paper on "Chronic Pyæmia from Dental Origin."

The patient, male, good constitution and habits, had suffered thirty years from neuralgia, besides having constantly recurring furuncles and eruptions in various parts of the body, which would often for months become running abscesses. He experienced burning and itching eruptions of hands and feet, which would finally change to stubborn ulcerations. His bowels were either stubbornly constipated or exhaustingly loose. He suffered from frequent rigors and febrile attacks of varying intensity, profuse night-sweats, retention of urine, serious constriction of the bowels and urethra. Lancinating pains darted from the maxilla to right side of bowels, bladder, limbs, hands and feet, or to whatever part that was locally affected at the time. This latter peculliarity, together with the discovery of a little pus exuding from the locality of the wisdom-tooth, led to a final correct diagnosis of his case.

The tooth referred to was extracted, and a speedy and complete recovery followed. As other sources leading to pyæmia and having their starting-point in the oral cavity, may be mentioned pyorrhœa alveolaris, alveolar abscess, abcess of the antrum, and dental caries.

The doctor related ten other cases similar to the above, which all yielded to the simple remedy of removing the offending tooth.

Dr. Lydston, of Chicago, said that both physicians and dentists should appreciate the important relation which morbid conditions of the mouth and jaws, and especially those which may be produced by septic absorption, bear to different general conditions. Septic matter is quite generally found about the roots of teeth, and may, under favoring circumstances, be absorbed into the blood, and there produce disturbances of greater or less degree.

The paper was further discussed by Drs. Walker, of London, Barrett, of Buffalo, Younger, of San Francisco, and Chance of Oregon.

Dr. Carr, of New York, gave a clinic on the "Treatment of Fractures of the Maxillæ with Modified Interdental Splint."

The majority of fractures of the inferior maxilla occur in the body rarely at the symphysis menti, but usually directly anterior or posterior to the mental foramen. A noticeable fact in connection with these fractures is that the victim rarely applies for treatment for several days succeeding the injury. He realizes that some of his teeth are loosened and also that he is painfully bruised, but does not seek surgical aid until he becomes alarmed by the increased inflammatory condition of the parts. There is but little difficulty in establishing a correct diagnosis, as usually the following symptoms are present—great pain in the effort to close and open the mouth, swelling, crepites, inflammation, inability to masticate, and marked irregularity of the teeth.

Treatment.—It is identical with that of other fractures, namely, to bring the parts into apposition and retain them firmly until ossification is completed. For treatment of fractures of the maxillæ there is nothing superior to the interdental splint. When properly adjusted, speedy union may be secured without deformity of the jaw or irregularity of the teeth. Before taking the impression a careful examination of the parts should be made. Loose teeth and spiculæ of bone should be removed, and the parts should then be brought as nearly as possible to their normal position. An accurate impression should be made with impression-compound or wax. The material used should be as warm as the patient can bear it, in order to prevent unnecessary pain and also to prevent further displacement of the parts. The splint is made of vulcanite and covers all the teeth of the lower jaw, and all the teeth posterior to the canine in the upper jaw—leaving a space of about three or four lines through which the patient may receive nourishment. Small holes are drilled in the splint over the grinding surface of each molar for the purpose of ascertaining whether its adjustment is proper.

The splint should first be adjusted to the sound jaw, then gently bring the fractured jaw into position until it has passed about two-thirds of the length of the teeth—then with a quick, firm motion bring the parts into position. Next apply a-four-tail bandage, which should be retained from three to five days; after this time, in the majority of cases, it may with safety be removed during the day but should be replaced at night until the removal of the splint. The patient should be furnished with an ordinary rubber syringe, and instructed to keep the mouth thoroughly cleansed. For disinfectants I use peroxide of hydrogen three per cent. solution, or a solution of bisulphate of soda in the proportion of ʒ j to ℥ j, of water.

In ordinary cases the splint should be retained for three or four weeks, according to the physical condition of the patient—unless unforeseen complications should arise. The application of the splint, combined with thorough cleanliness, will usually be all the treatment required.

The advantage, besides those previously stated, are that the patient experiences but little pain and inconvenience, and can, as a rule, attend to his business almost immediately after the splint is applied.

It is not necessary that all the teeth, nor, indeed, that any should be present in the mouth in order to make the splint serve its purpose. In the first case the rubber can be made to take the place of the missing teeth, and in the latter case a perfect adaptation of the splint to the alveolar ridges can be secured, and will be found to keep the parts in perfect apposition.

Should it be deemed advisable to place a splint in position within an hour or two after seeing the case, one can be constructed entirely of ordinary gutta-percha, with just enough wire inside to stiffen it. Dr. Carr demonstrated this, which is very simple and can be made by any surgeon.

A number of gentlemen examined the appliance and pronounced it very satisfactory in every way, the main points being its simplicity of construction, its effectiveness, and the ease with which it is adjusted and worn by the patient.

Dr. Brasseur, of Paris, read a paper on "The Use of Air in Dental Therapeutics."

He urged that bichloride and biniodide of mercury and carbolic-acid crystals, for destroying microbes in the oral cavity and, especially, in carious cavities of teeth, should be supplemented by the use of hot air.

Dr. Brackett, of Newport, discussed the paper at length, laying considerable stress on the efficiency of crystallized carbolic acid as a germicide in carious cavities in teeth. Drs. Truman and Morgan took part in the discussion.

Dr. Cravens, of Indianapolis, read a paper on "The Management of Pulpless Teeth."

The system is based on the proposition that a pulpless tooth is not necessarily dead. The pulp being devitalized, the tooth still retains life through its pericementum. The usual course of treating pulpless teeth with escarotics and irritants cause irritation and final destruction of the pericementum, and the result is that the tooth, instead of being preserved, will act as a foreign body, and will be thrown off by nature through abscesses ; or, worse still, will lead to no end of nervous derangements.

The treatment suggested by the reader is to thoroughly cleanse the pulp-canal, and at once hermetically seal it with tin-foil.

Dr. Fillebrown, of Portland, did not agree with the essayist in the method outlined in the paper. He gave a short synopsis of the method he employs in treating pulpless teeth, which the Section seemed to endorse.

Dr. Harlan, of Chicago, objected to the views of the essayist. A dead pulp produces no irritation in the canal ; the disease which it causes is beyond. If you could mechanically displace an odor and should then fill the root-canal without disinfection, disaster would inevitably follow unless there should be a fistulous outlet.

Dr. Barrett, of Buffalo, said, whether viewed from the standpoint of pathology or etymology the paper is alike remarkable. That such a mass of absurdities could be presented at a meeting of the World's representatives in dentistry is to me astounding, and I protest against its acceptance as the standard by which to judge the intelligence of American dentists. Why the exploded dogmas of twenty-five years since should be gravely and in all sincerity presented at such a meeting as this is, I must confess, something for which I was not prepared. The assertion that a closed chamber in which exists the septic debris and the products of decomposition of tooth-pulp should not be opened and evacuated, I can scarcely believe is made in calm earnest.

Modern antiseptic pathology has taught us certain facts, and among these is the knowledge that the first step in the treatment of aseptic cavities is complete drainage ; second, disinfection and the removal of all the products of disorganization ; third, destruction of septic organisms ; and finally the complete sealing of the cavity against further infection. These comprise the essential steps in the treatment of septic root-canals. I will not insult the intelligence of those present by presuming to enlarge upon this and by going into the details of treatment, for this is not a body of tyros. I object, however, to a consideration of the subject from the standpoint of this extraordinary paper.

Dr. Weeks, of Minneopolis, read a paper on "Matrices as Adjuncts in Filling Teeth."

The essayist reviewed the different appliances for simplifying what would otherwise be very laborious operations. A perfect matrix should be simple in construction, cheap, easily adapted, and not too stiff, so that when applied it will yield just enough to allow sufficient gold to pass beyond the walls of the cavity for a good finish.

Dr Guilford, of Philadelphia, in a few brief remarks, indorsed the sentiments expressed in the paper.

Dr. Pradère, of Lyons, read a paper on "Phthisis Cured by the Continuous Application of Medicine to the Palate."

Immediately after the paper was read, Dr. Truman, of Philadelphia, moved that it should not be accepted by the Section, but should be referred, without discussion, to Sectlon 1., in General Medicine; also embodying that the Executive Committee be censured for allowing such a paper to come before the Section. The motion was seconded by Dr. Abbott, of New York, but the Chair ruled that, inasmuch as the Executive Committee had seen fit to admit this paper, it would be out of order, to put the motion to the house. Dr. Truman dissented from the decision of the Chair and renewed his motion. The question being called, the paper was referred to Section 1.

A number of gentlemen gave clinics in the treatment of diseased conditions of the oral cavities, and others demonstrated their methods of filling teeth and constructing artificial dentures for patients. These clinics were spoken of as the most successful features in this section, and it is but just to say that a good deal of credit is due Dr. Bodecker, of New York, for the result.

Dr. Metnitz, of Vienna, read a paper on "Osteomyelitis."

In October, 1886, a lady, aged forty-three, had two teeth extracted A few days later she suffered with chills, which were followed by slight mental disturbances. The seventh day the patient became unconscious, in which condition she was brought to the hospital. Examination revealed that there was a large swelling over the left cheek, extending to the temporal region; the skin covering this swelling was tense and pale in color; the sclerotic was highly colored (yellow), and the skin showed yellow tinge; the pupils were without reaction. The odor of the breath gave evidence of necrosis. The submaxillary glands were very much enlarged, and the neighboring tissues infiltrated. There was unconscious urination and defecation. Death occurred the following day. The postmortem examination showed the membranes of the brain to be thickened and traversed by numerous vessels. The left hemisphere was covered by a layer of pus, and the right hemisphere showed considerable pus along the track of the vessels as well as several pus-depots. The brain-substance was quite soft. The examination of the oral cavity disclosed that of the two teeth extracted the upper alveolus had almost entirely filled up with healthy granulations, whereas the lower was filled with pus. The mucous membrane in the region of this diseased alveolus was very much discolored and could be easily removed in pieces. The probe discovered nothing but dead bone. All the muscles of the neck which are attached to the left side of the lower jaw were infiltrated with pus. The periosteum was separated from the left side of body and ramus of the jaw. The alveolus of the extracted wisdom-tooth communicated by two good-sized openings with the marrow-cavity, and the marrow itself was discolored and infiltrated with fat. The cause of this extensive destructive action is no doubt to be looked for in the unclean condition of the alveolus after the extraction. Sections of the jaw show that the medullary canal was very much enlarged.

Kocher, Rosenbach, and Busch, in experimenting on animals, have found that it is impossible to produce an acute pus-forming osteomyelitis either through traumatic injury or chemical or mechanical irritation, but that such a condition can readily be brought about by infecting the fresh wound in the bone by decaying substances.

The second case was one of multiple osteomyelitis. The patient, male, aged seventeen, suffered from an attack of osteomyelitis of the humerus, the ulna, and the lower jaw. According to Billroth, it is not settled whether this condition (multiple osteomyelitis) is due to septic influences acting on various places at the same time, or whether the infection dates from one point.

Death in this case, as in the first, was directly due to acute suppurative meningitis. When we have to deal with a simple inflammation, energetic antiseptic treatment will prove quite sufficient. In severe cases of osteomyelitis Billroth advises that the seat of disease be reached as soon as possible—the pus evacuated, the cavity thoroughly disinfected, and dressed with antiseptic dressing. Many cases present no actual depots of pus, or abscesses, but simply an infiltration of the marrow. In such cases Billroth holds it of little value to open into the medullary canal. Neither does he advocate disarticulation or resection, because, in the first place, the exact extent of the disease cannot be foretold, and secondly, the medullary substance of a patient suffering from osteomyelitis is in such a susceptible condition that a new injury would almost certainly prove fatal.

Dr. Jenison, of Minneapolis, read a paper on "Art in Dentistry."

The essayist advocated the restoration in gold of all teeth that had been destroyed by caries, thereby improving both their usefulness and beauty.

In constructing artificial dentures, more time should be given to the restoration of the features of the patient, and for that purpose single and not section teeth should be used.

Dr. Allen, of New York, closed his remarks by saying that inasmuch as the countenance reveals the thoughts of a person, great care should be exercised in restoring lost features.

Dr. Andrews, of Cambridge, read a paper on "The Origin of the Dental Fibril, Illustrated by Aid of Stereopticon."

Dr. Andrews described his process of preparing and mounting the specimens for the microscope, which differed in no essential respect from the latest methods employed by others for that purpose.

In speaking of the formation of the fibrils, the essayist says there are two kinds of odontoblasts—those which are square toward the dentine; and others, just by the sides of the first mentioned, which are pear-shaped. From these latter, and not from the first (or square end ones), originate the dental fibril.

The stereopticon views presented by the doctor showed very clearly with what patience, earnestness, and intelligence the essayist worked to establish his view of the question. And the hearty appreciation accorded him by the Section was well merited.

Dr. Abbott, of New York, in opening the discussion, paid a high tribute to the reader of the paper for the hard work done in behalf of his specialty. In order to understand the process by which the dental fibril is produced, it is necessary for us to consider the matter from the third to the fifth month of intra-uterine life, at which period of the existence of the fœtus the papillæ of teeth are so far developed that a material change is observed to be taking place The papilla is a mass of myxometous tissue, liberally supplied with medullary elements. In some instances at three months, in others as late as the fifth of intra-uterine life, a coalescing of several of the medullary corpuscles into one may be observed upon the periphery of the papilla adjacent to the enamel organ, which at this period may be observed forming a cap upon the papilla. The united medullary corpuscles are known as odontoblasts. The impression has generally prevailed among histologists and embryologists, that the odontoblasts were directly formed into dentine. This theory, through recent researches, has been proven to be incorrect. The odontoblasts, when viewed with a power of 1,200, show a delicate reticulum, which unites the nuclei with the walls of each corpuscle and with each other. This reticulum, as well as the walls of the odontoblasts, are the living matter which remains as the living portion of the dentine. Before the beginning of the disposition of lime salts, the odontoblasts are reconverted into medullary substance. As such they receive the calcareous basis-substance, and thus a certain territory of the papilla becomes dentine. While this process of calcification is going on, another row of odontoblasts makes its appearance, from the sides and ends of which prolongations of the living matter may be seen running into the canaliculi of the dentine already formed. A spindle or pear-shaped odontoblast gives off one, while those with broad ends give off two, three, and even five prolongations. If the views advanced in the paper were correct, it would necessarily follow that territories of considerable size would be left in the dentine with no canaliculi whatever ; nor is there any provision for furnishing these territories with any living tissue.

Dr. Fletcher, of Cincinnati, read a paper on " Protective Dentine' Illustrated by Stereopticon."

This paper was listened to with great interest. The slides which were shown on the sereen showed the different kinds of protective dentine, and the essayist gave his views of how these different efforts on the part of nature to protect herself are brought about.

Dr. Sudduth, of Philadelphia, supplemented the reader's remarks by stating that the odontoblasts remain after the development of the dentine, but can be stimulated to produce or perform their function of forming protective dentine.

Dr. Atkinson, of New York, complimented the gentleman on producing such well-digested papers.

Dr. Mummery, of London, exhibited photo-micrographs of all the structures of the tooth, and explained the best method of producing them.

Professor Abbott, of New York, and Dr. Andrews, of Cambridge, were in charge of the department of Microscopy. Every facility was afforded the members of this Section to acquaint themselves with dental microscopy, both physiological and pathological. Among the ground specimens shown by Professor Abbott were those of carious, congenital pathological enamel, hyperostosis of the roots of teeth, and deposits of secondary dentine. Dr. Andrews exhibited serial sides of developing teeth, and the development of the dental fibril. About forty photo-micrographs were especially interesting and valuable.

About thirty gentlemen gave clinics in filling the teeth with gold, pivoting teeth, constructing artificial dentures, and treating (surgically) diseased conditions of the gums. It would require too much space to enumerate all the gentlemen who acquitted themselves in such a creditable manner.

Dr. Goddard, of San Francisco, read a paper entitled "Pain in the Temporo-Maxillary Joint, Caused by Irregularity of the Teeth."

Patient, thirty years old, experienced pain in temporo-maxillary joint during mastication, which was caused by straining the muscles and ligaments, owing to masticating with the jaw protruded. When the teeth were brought together, as in the act of eating, the incisors alone touched, and the bicuspids and molars were about one-eight of an inch apart. The treatment employed consisted in spreading the upper teeth and thereby securing the proper articulation.

Dr. Chisholm, of Tuscaloosa, read a paper entitled "The Influence of Weather Changes on the Human Organism."

The normal atmospheric weight on man is 14.7 pounds to the square inch at the sea level. The body is sustained by an equal power of resistance, wisely provided. If the pressure be less, the surface of the body will be distended, and the superficial circulation less restrained. This change can be brought about by exposure at great altitude, as well as by natural physical causes, when the circulation will be disturbed just the same. Any undue pressure on a portion of the body may then be felt. May not this disturbance of tension on soft tissues which are fixed to the bony framework of man, or where disease has a seat in periosteal and ligamentous attachments, be liable to greater inflammation? Or when a nerve of a tooth, which in a state of health is inclosed in a bony chamber (which has no expansive liberties, nor needs them as long as health continues), becomes exposed through a small aperture; when the normal atmospheric balance is lowered, the pulp has a tendency to be drawn through the aperature and takes on inflammation, probably followed by congestion and complete devitalization.

A report from the Pennsylvania Hospital, some years ago, on the observation of barometric pressure in surgical operations, shows that in 259 operations the barometer was ascending in 102, descending in 123, and standing in 34. Fifty-four of the whole number were fatal, 11 having been operated on with barometer ascending, 25 when descending, and 8 when standing.

The Section was honored by a visit from the President of the Congress, Dr. N. S. Davis. In introducing him, President Taft recounted the efforts that had been put forth by Dr. Davis to secure recognition of the Dental Section. To him more than to any other man in the medical profession is due the credit of having removed the obstructions in the way of the dental specialty.

Dr. Davis replied: Twenty-two years ago I had the pleasure of entertaining the members of the American Dental Association, then assembled at Chicago, at my house. On that occasion I expressed the hope that some day, in the near future, we might meet on equal grounds. My hopes of that day are realized to-day. At the last meeting of the American Medical Association, when the question was brought up to admit dentists holding their degree from a recognized institution, it met with no opposition. The action of that body has forever removed the obstacle which had been in your way, and you are now on an equal footing with your medical brethren. He congratulated the members for the interest they took in the advancement of the healing art, and closed by warning them not to fall into "schools," but to meet everyone on the broad field of science.

Dr. Talbot, of Chicago, read a paper on "Etiology of Irregularities of the Jaws and Teeth."

This paper was very exhaustive and thoroughly well prepared. The writer showed throughout an intimate acquaintance with the subject, and the Section was not lacking in appreciation of his efforts

The paper was discussed by Dr. Barrett, of Buffalo.

A paper by Dr. Patrick, Belleville, on "Irregularities," was read by title; also one by Dr. Angle, Minneapolis. entitled "Notes on Othodontia, With a New System of Regulation and Retention;" also by Dr. Ingersoll, Keokuk, on "Inflammation of the Oral Tissues."

A very interesting clinic was given by Dr. Starr, of New York, in capping the exposed pulp of a tooth.

The operation caused the patient very little pain, and all those who had the opportunity to see agreed that it was a success.

Dr. Younger, of San Francisco, implanted a tooth. Great diversity of opinion was expressed as to the ultimate result ot this method of thus supplying the lost teeth.

Dr. Adair, of Gainesville, completed the treatment of a case of pyorrhœa alveolaris.

Thirty-two other gentlemen gave clinics in filling teeth and constructing artificial dentures.

Prof. Busch, of Burlin, read a paper on "The Comparative Pathology of the Teeth, With Special Reference to the Tusk of the Elephant."

A number of specimens were shown by the doctor to illustrate his paper. At the close of his paper he exhibited an instrument for removing the small birth-marks so often found on the face. The instruments have a circular cutting edge ranging in size from one-fourth to half an inch in diameter, and fit into the dental engine. The mode of operation consists in selecting a knife the size of the mark to be removed, placing it upon, quickly revolving the mark. It takes only a moment to accomplish this, and it is said to be almost painless. The only dressing the doctor applies is dry cotton, which he leaves in position for from six to eight days, at the end of which time the part is perfectly healed.

The paper was discussed by Drs. Atkinson, of New York, and Barrett, of Buffalo.

Dr. Andrieu, Paris, read a paper on "The Sixth Year Molar." He held that the sixth year molar being in development, eruption, and structure an organ of transmission from the temporary to the permanent set, it should be extracted when the permanent teeth are in position. More room is gained by this procedure, and a longer period of usefulness insured to those remaining.

Dr. Sheperd, of Boston, expressed his regret that such sentiments should still be prevailing among the profession. He cited cases from practice, when the extraction of these teeth caused not alone loss of valuable masticating surface, but actual irregularity of the ones remaining.

Dr. Dubois, of Paris, stated that he wished the Section to note that the ideas expressed in the paper were not carried out by the dentists in France.

Professor Abbott, of New York, could see no difference in structure between the sixth year molar and the other permanent teeth, but a very marked difference was apparent between that and the temporary teeth.

A paper by Dr. David, of Paris, on "Aphthous Stomatitis," was read by title.

Dr. Marshall, of Chicago, read a paper on "Operation for the Cure of a Persistent Neuralgia of Both Temporo-Maxillary Articulations, and reflected Pain in the Right Brachial Plexus."

Patient, female, forty-two years of age, was operated on some eight years before, for the removal of an osteo-sarcoma of the right inferior maxilla. Extensive suppuration followed, and the wound did not heal for several months, Considerable cicatricial tissue was formed, and the jaw displaced to a considerable extent. Neuralgia dated from a healing of the wound, and the conclusion arrived at was that the irregular position of the jaw was the cause. An operation for the relief of this condition was performed, and the neuralgia ceased. The doctor described the steps of the operation at great length, but failed to show that it differed from methods generally employed.

The following papers were read by title ; "Articulation of Artificial Teeth," by Dr. Cruttenden, of Northfield : "Power in Dentistry", by Dr. Elliott, of London ; "Porcelain Filling," by Dr. Moore of Detroit.

Dr. Thompson, of Topeka, read a paper : "Does Function Control the Evolution of Structure ?"

Some time since, Dr. Pierce, of Philadelphia, discussed a subject similar to that at the head of this paper. After noticing the mechanical forces involved in and influencing the evolution of the teeth, he says : "Those cumulative forces are utilized through heredity, and while so potent in tooth-evolution, exert a similar influence in the development and modification of all other structures and organs. All departments of biology recognize the fact that heredity, adaptation, and growth, being of special importance in the evolution of the organic body, must therefore be regarded as especially formative functions. Adaptation to environment might be called the ancestor of functions, as function is of organization. Illustrations of modification of structure in response to function are very numerous, in which it is shown how an organ may be completely changed or a mere rudiment be fully developed by the demand for the performance of a function unknown before."

A century ago Lamarck laid down the following laws concerning the development of organic life, which we, with all our accumulated facts, can change but little. In the second law he said that the production of a new organ in an animal body results from the supervention of a new want continuing to make itself felt, and a new movement which this want gives birth to and encourages. Third law : The development of organs and their forces of action are constantly in ratio to the employment of those organs. Fourth law : All that has been acquired, laid down, or changed in the organization of the individual, in the course of this life, is commenced by generation and is transmitted to new individuals which proceed from those which have undergone those changes. Altered wants lead to altered habits which result in the formation of new organs, as well as in modification and growth of those previously existing.

In our study of the subject, we will confine our observations to that field in which we, as dental and oral specialists, are most interested, the teeth.

Everything is made for a purpose, and the purpose must precede the thing made for effecting that purpose. Nature plans her work as deliberately as a man plans his actions. The means for accomplishing an end are not the cause of execution, but the effect. The organ is the effect, and function is the cause of structure. As food-selection is the cause of the function, so the function of the acquisition and preparation of food is thus the cause of the masticating apparatus.

If function is the cause and support of structure, if an organ develops or atrophies as it is used or disused, if the impulse of active employment dictates the evolution of parts and tissues in succeeding generations, if organs have been suppressed through disuse or remain in various forms as mere rudiments—their function having passed away—then, indeed, must the teeth of man be tending toward final and inevitable suppression.

If in the future of physical education there shall be found a place for education in the accomplishment of masticating food, then, indeed, may the teeth be improved and developed by exercise, as the muscles and lungs are improved and developed.

The President congratulated the members on the interest they had shown throughout the session, and hoped great good might come from this Congress, both to the profession and to their patients.

A vote of thanks was voted to the President, L. S. Davis, for the exertion he had put forth in behalf of this section.

Also a vote of thanks was tendered President Taft and the Executive Committee.

WHY HE REMOVES TEETH.

Permit me to specify the principal reasons for which I think it wise to remove teeth :

First, to make room for the others. I have not brought any casts to demonstrate the success of regulating by removal. Probably Dr. Davenport would find the cusps so disarranged that he would not call it success. But I know, and so do most of the gentlemen present, many mouths which have needed no other regulating process for prominent cuspids and crowded incisors than the removal of the first bicuspids. No operation in dentistry gives surer results. I remember, too, an extreme case where the cuspids came late and entirely out of the closed arch, and the mouth was restored to exceptional beauty by extracting the cuspids, the first bicuspids touching the laterals. There is hardly a tooth except the upper centrals which I have not extracted or seen extracted with marked success for the simplifying of the regulating process.

Secondly, I extract teeth, which are obvious failures, from mouths in which the other teeth are of better quality. If I find in a new mouth fairly good second molars just come, with the first molars decayed all over, or half broken away, with exposed pulp or abscess, I make no delay in removing the first molars. They are failures, and nature is trying to get rid of them. When a tooth has long been defying my best skill ; has been carefully treated to the apices of the roots, and will not be quiet ; has been dosed outside and inside with the whole dental pharmacopeia and still rebels, unless it is absolutely indispensable, I condemn it as doing and sure to do more harm than good. This very day a new patient said to me: "There is a tooth which I wanted to have out, but the dentist was't willing." I found a molar very largely filled and well filled. He said the pulp had been removed and the roots filled, and by the character of other operations in his mouth I saw he had been in skillful hands. But he added: "It grumbles whenever I have a little cold, and is so tender if I chew on it that I have given up using that side of my mouth." This gentleman has never lost a tooth, and I shall not condemn this one without further acquaintance. But if this proves a permanent condition (as it may), the question may be fairly raised whether it is worth while to give up the entire use of half the mouth in order to retain the nice adjustment of the cusps.

Thirdly, I extract teeth sometimes to save the neighbors. Suppose a molar and adjacent bicuspid which have been filled rather largely on the surfaces of contact, ane are now again decayed at the cervical border of those fillings. The new cavities are far under the gum, with no satisfactory border toward the root. A deep pocket has been formed between the two teeth, and both cavities are sensitive. Suppose the row of teeth unbroken, and the others pretty good. Those of us who are over forty will not have much hope of any fillings that may be made there, no matter with what skill. But extract the bicuspid, and any tyro can save the molar. Precisely the same condition occurs between the second and third molars, especielly of the upper jaw, and it is equally simplified by removing the wisdom-tooth.—DR. J. SMITH DODGE, in *Dental Cosmos.*

EDUCATION—HERE AND THERE.

In his very exhaustive and very praisworthy paper, Dr. Louis Ottofy mentions the German system in a way that would indicate to those not familiar with the facts that it is superior to the methods of teaching in our own or other countries. He says that the government has charge of the schools. This is true in this way: The government selects the teacher who is to have charge entirely of a certain department, and he has the appointment of the teachers. In the dental school in Berlin this is true. Now, if the professor of operative dentistry is pig-headed and likes his own ideas he selects teachers who will teach his ideas, and the pupils are not allowed to receive instructions except in that line. Others may volunteer their services, but they are shut out. Dr. Herbst offered to demonstrate his method before the students, but he was not permitted to. The students must receive only the ideas of this one man, their teacher. There is one feature about dental education here which cannot well be superseded by those in the same position over there. Here the people, from whatever reason, know more about dentistry, and they are willing to pay more for dental services. The result is that they have a fee system on the other side which seems absurd. No matter what is done for the patient the fee is the same. This has been in a measure overcome by some American dentists, but the same millstone is around the neck of the great majority, and will not be removed until the people are educated to a higher point. The great mass of the dentists there are in a low, degraded position compared with practitioners here. Here we have in this body representatives from all over the land ; if men have anything to demonstrate to their brethren they are given the opportunity to prove its worth. It is our desire to have our students in the colleges learn all they can from whatever source that will help to make them better dentists.—PROF. FRANK ABBOTT, in *Dental Cosmos.*

TWO SYSTEMS OF MEDICAL EDUCATION CONTRASTED.

In one case : no preliminary examination; only two short courses of lectures required, the second identically with the first; the novice required to attend lectures on every subject every day, neglecting preliminary work because the time which might have been devoted to it is worse than wasted in hearing learned talk which he was not prepared to understand; valuable clinical and laboratory opportunities wasted; no examinations to advance to higher grades, for there are no grades; a final examination which is so superficial in many instances as to be little better than a farce, and whose meshes are large enough to let mediocrity and inferiority, as well as the superiority, which is always present, pass through with greatest ease.

In the other case: preliminary examinations which require a certain, even if insufficient, preparation; three years of training at the college, the novice beginning at the beginning; all his time employed in hearing and doing what he can and should understand; his capability and progress tested in each department by weekly oral and monthly written examinations; his advance from grade to grade checked if his fitness be not established; through clinical and laboratory work; searching yearly examination; and a final examination, which, although of great severity, does not, except in rare instances, result in rejection, because the student has been educated in a way which accords with nature and does not violate it.—*University of Syracuse.*

MOVEMENTS OF GROWING TEETH.

The accompanying cuts are from Dr. G. V. Black's "Periosteum and Peridental Membrane," recently completed in the *Dental Review*, and about to appear in pamphlet form. They illustrate, and enable one to comprehend, the movements of the teeth and changes that take place in the alveolar process of the anterior parts of the jaw, and will prove of especial value to those much engaged in the correction of irregularities.

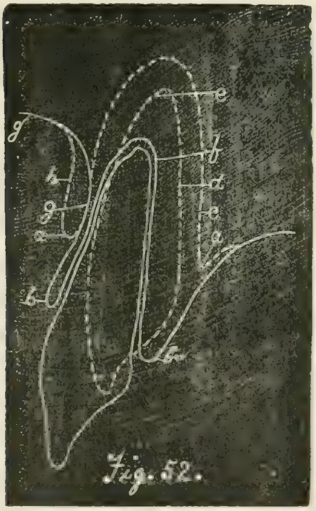

Fig. 52.

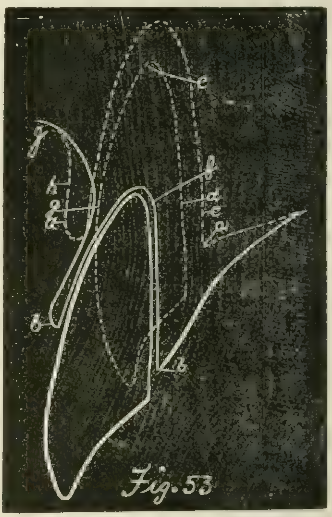

Fig. 53

The first (Fig. 52) is described as a diagramatic illustration of the movement of a central incisor during the growth of the alveolar process between the ages of twelve and twenty-one years. The broken lines represent the tooth and its alveolus at twelve years of age, and the solid the same tooth at twenty-one. This cut represents the maximum movement.

The other figure (Fig. 53) represents the minimum movement. The growth of the process is represented in each figure by the movement from *a*, *a* to *b*, *b*. The tooth is carried forward by this growth, and the alveolus is filled with new bone from the line *e* to the line *f*.

CONDUCTOR'S DEPARTMENT.

AMERICAN DENTAL ASSOCIATION.

This old standby met again at Niagara Falls, in August, and enjoyed one of the best of meetings, notwithstanding the change of place, the International Medical Congress, and the publicly expressed fears that the thing would prove a fizzle. When President W. W. Allport called the society to order, he and his associate officers smiled satisfactorily at the showing made by men who take pride in being on hand, and especially in cases of emergency. While not as large a meeting as usual the interest was greater, and the time wholly and thoroughly occupied by the essayests and those who discussed the several reports and papers. The absence of one disturbing element calls for special mention. A year ago the time and attention of many in attendance was taken up by manufacturers and dealers' representatives in adjoining rooms who had something to exhibit or sell, and this during the session of the association. This year, however, the adjoining rooms were in the hands of the association itself, and sublet to exhibitors and others only on condition that the rooms be closed at times named by the executive committee. The plan worked beautifully and to the satisfaction of all concerned. May it be repeated at future meetings. The chief of the final acts of the association was the election of Dr. Frank Abbott, of New York, as president. For years Dr. Abbott has been a most faithful attendant, and has rarely, if ever, failed in his annual contribution of scientific work. With him the association ought to start in again as good as new. Old Point Comfort was named as the next place of meeting.

THE SINEWS OF WAR.

Members of the First District Society have been requested to contribute $5 each towards a "protective litigation fund," and they'll do it, too,—every mother's son of them.

The resolutions inviting this interest have also been adopted by the American Academy of Dental Surgery of New Jersey, which means a handsome addition to the fund.

The Second District Society has voted $350, or $5 per member, for the same object.

The Buffalo local dental society has done likewise.

The Rochester Dental Club did its share during the progress of the recent suit.

The Seventh District Society contributed something from the treasury at its annual meeting.

The American Dental Association has set aside $1,000, subject to control by its executive committee, for the defense of any member or members for alleged infringment of patents claimed by the International Tooth Crown Company.

Other societies have the subject under consideration, and will be heard from in the near future.

THE CONGRESS

The Ninth International Medical Congress is a thing of the past, and the section of dental and oral surgery's opportunity to make itself felt and appreciated was fully taken advantage of, and with results at once satisfactory to those who gave their time, their money, and their best intellectual effort in its behalf. Of the details of its management but little is at present known outside the circle of those who participated in the preparatory work, and were present when such work was made apparent to all in attendance ; but as these matters will of necessity appear in the very full reports of the several monthlies, the opportunity to accord due recognition will be afforded every member of a profession that, in a certain sense, was on trial before the most important medical body of the world. That the section acquitted itself creditably may be inferred from even the summarized report on another page, and is matter for congratulation.

RECENT CHRISTENINGS.

These be times in which we live, and the vocabulary grows apace. The new Dunglison must needs add to "housemaid's knee" the more recently discovered affections of "dentist's leg," "pitcher's arm," and "smoker's heart." The first two are English, therefore in good form; the last American, and for that reason nondescript—at least for the time. "Pitcher's arm" is very closely related to "losing club;" while "smoker's heart" is said to be a little racket worked by cigarmakers, through coroner's physicians, against the omnipresent cigarette. "Dentist's leg" is confined to three cases reported in a foreign medical journal and a few kickers at American dental conventions. As for "housemaid's knee," it may be obviated or a cure effected by heeding the advice—"Use a mop and pray standing."

THE STATE SOCIETY'S STUDENTS.

There seems to be a little misunderstanding on the part of some who wish to take advantage of the State Society's privilege to send annually a student to each of the two colleges—New York and Baltimore—and for their benefit we repeat the substance of a former statement in regard to the matter.

The conditions are: 1st, Application for scholarship to the State Board of Censors; 2d, proof of inability to pay his tuition; 3d, examination by the Board as to his fitness to enter upon the study of dentistry; 4th, the recommendation of the applicant by the Society to the college as its student-representative. In case both applicants of the same year elect to attend the same college and fail to adjust the matter to their mutual satisfaction, the Board decides for them, the decision of the Board being final.

HAVE AN "OFFICE."

One of the little things that catches the eye of New York and other big-city dentists visiting in the country, is the sign or advertisement of the local dentist, calling particular attention to his "rooms," his "parlors," etc., never once mentioning his "office," and himself only in small type, as if he regarded his possession of chairs, tables and pictures of primary importance to those in need of dentistry, and himself and armamentarium as merely dancing attendance thereon. It is only a step or two from this to "apartments," "studios," and "galleries," with the qualifying word "dental," to complete the sinking of the dentist and his profession in bric-a-brac and other accessories, the true function of which is to set him off as a man mindful of the comfort and convenience of his patients, but always secondary to self and occupation. One may not be able to have what he wants, but of the things he must have, his "office" comes first.

RECALCIFICATION OF DENTINE.

Recalcification *never* occurs in dentine in contact with gold; it *never* occurs in dentine in contact with gutta-percha; it does occur, with rare exceptions, in contact with zinc plactics, amalgam, tin, and combinations of gold and tin. The "rare exceptions" are where the filling material is placed in contact with dentine that is not only decalcified, but dead. Dogmatic, reader, but true.

A NEW LOCAL ANÆSTHETIC.

Stenocarpin, so-called from the likeness of the Tear Blanket Tree, of Louisiana, from which the alkaloid is obtained, to the Acacia Stenocarpo, promises to more than rival cocaine. Let us hope for something more than promises, on which we have subsisted too freely of late.

WASH YOUR DAM.

According to Balland, the deterioration of vulcanized rubber is due to the formation of sulphuric acid from the slow oxidation of the contained sulphur. He recommends frequent washing in water, pure or slightly alkaline. Much of the rubber dam now in market needs a series of washings to make it fit for use.

MEMORANDUM FOR PROF. C. N. PIERCE'S OPPONENTS.

Science says of Prof. E. D. Cope's paper before the American Association for the advancement of science: It "showed in a striking manner the value which mechanical force may in some cases have as a factor in development. His statement, also, that a given structure may or may not be the best which could be devised for performing its particular function, but that it must be such as could be developed from a pre-existing form, is one which, if earlier understood, would have saved much misdirected effort."

A card from Prof. Cope, in answer to an inquiry, says the paper will appear soon in the *American Naturalist*.

THE MEDICAL RECORD'S REPORT OF THE CONGRESS.

Evere one in attendance at the I. M. C. felt greatly indebted to the publishers of the *Medical Record*, Wm. Wood & Co., for the excellent daily report of the doings of the several sections, many if not most of which were in session at one and the same time. Without this or its equivalent members of a given section (the Oral and Dental was No. XVII) would have been at a loss to know what had been said and done in others, and, of course, have come away but partly informed of the work in progress immediately about them. Editors of dental and medical periodicals also have been placed under obligation for a full series of slips of the *Record's* special report, a mere synopsis of which would fill more space than the average periodical could do justice to in half a dozen issues. We take pleasure in expressing our own obligation for the favors received at the hands of the house above mentioned.

DOTH IT NOT? IT DOTH.

This is the way he began his report to an august body not a thousand miles from Albany, when in pursuit of a XX :

"In the year 1879, in the rural districts, there was a peripetetic tooth puller which his name it was Pride—same Pride mentioned in scripture as going before a fall : Timothy X. 16. He took no dental journals, no dental literature of any kind, no daily, no weekly paper, and had never heard of such a thing as the registry until the time to enter himself thereon had expired—at which he was exceeding wroth. He came to Steuben county from Pennsylvania; he wrote the Secretary in regard to it, and he wrote me. We informed him there could nothing be done. He then took legal council, and as there was a prospect of fees his lawyers told him they could have the registry reopened. Consequently there issued a writ of mandamus, or words to that effect, meaning the same thing (same Tim. X, 16), for the county clerk to appear before the county judge and show cause why he should not reopen the registry and allow Pride to fall thereon."

But wherefore? Doth it not appear in full in the chronicles of the State Society?

THE GEO. P. DAVIS VULCANIZER.

Contrary to custom, we go out of the way a little to say a good word for a good thing manufactured and sold by the publisher of the ODONTOGRAPHIC JOURNAL. The article in question has been before the profession for some time, has been throughly tested by competent laboratory workers in different parts of the country, and has without exception received their hearty endorsement, whether for the effectiveness with which it does its work, the ease with which the several parts are combined and controlled, or the highly artistic appearance of the whole apparatus. Numerous as these testimonials are, not one has been solicited ; its inventor, designer and manufacturer, preferring as a mere matter of business, to place what he knows to be a first-class article on the market on its merit solely. The numerous points placed to the credit of the apparatus may be stated as follows: The original cost, expense of running, the combination of the several parts, their accessibility, the rapidity with which the temperature and pressure may be increased or reduced, the ease and certainty with which plastic rubber may be converted into the toughest vulcanite of uniform texture and color, and last, though less important, the style and finish as a first and successful attempt to make laboratory apparatus correspond with that of the office. Finally, it may not be amiss to say that there are eighteen of these vulcanizers in use right here at home, and every one of them giving daily perfect satisfaction.

FIRST DISTRICT—IT WILL CELEBRATE AGAIN.

In January the First District Society will celebrate its nineteenth anniversary and attempt to outdo its effort of a year ago, an occasion well remembered by those fortunate enough to be there and see and hear even a little of what was so generously furnished for their entertainment and instruction. For years past this Society has occupied a most conspicuous place in the doings of the profession, its meetings and clinics supplying a liberal store of the material that goes into the make-up of our most readable journals. Of the character of its work, its practical value, there is no occasion to speak, as this is well known to all who give any attention to such matters. Of its entertainment in connection with its anniversary meetings the only criticism possible is that there is too much of it to enable members and guests to do it justice. And yet we hear of the determination to eclipse all former effort, whether from a social or scientific standpoint, and judging by the past there is every reason to believe that the scheme will be carried to a successful issue. And nothing makes this more certain than the fact that our old friend, Dr. W. W. Walker, is this year its President, a position that makes it more incumbent upon him than ever that no stone be left unturned that will in any way contribute to the success of the meeting. That he is more than equal to the occasion may be inferred from his past successful efforts in the Society's interest as Chairman of the Executive Committee. May the First Society have many anniversaries, and may W³ always preside.

PELLETS.

The boy stood on his little sled,
  And locked down on his toes,
And down the slippery hill he sped,
  Upset and smashed his nose.
He tore his breeches, ripped his coat,
  And skinned his little pate.
When he went home he told his ma
  He'd run against the gate.—*Acrousetic.*

"Pus-depots" is a good word. Put it down for future use, crediting it to Dr. Metnitz, of Vienna.

There is a good deal of philosophizing in the *Archives of Dentistry* for September—and its good, too.

Among the new things exhibited at Niagara Falls this year was an automatic plugger, the invention of Dr. Frank Abbott.

"Phthisis" got no grip on the dental section, Prof. Truman's prompt action landing it where it belonged, in Section 1.

That was a generous thing done by Dr. Davis in the American Medical Association; but it may yet get dentistry into trouble.

The man who is made tired by talk no longer says "Rats," but "Go pay for your teeth." Let us hope some folks will do it.

A local dealer in dental supplies received recently an envelope having in one corner, "Vulcanized air given for extracting teeth."

In her "address" before the Michigan Dental Alumni Dr. Kate C. Moody talked "like a little man." Read her in the *Dental Register* for August.

The *Western Dental Journal* improves from month to month. The editorial corps has to all appearances got on its working clothing. Keep 'em on.

Dr. H. C. Meriam, in determining its value, says "a tooth is worth itself, the teeth with which it occludes, and all that they united can do for the organization."

"Bright things fell from Bessie's lips," in Mrs. Holmes' last novel, probably means that Bessie dropped the gold filling out of her teeth.—*Rahway Advocate.*

The Fifth District Society will hold its nineteenth annual meeting at the Vanderbilt House, Syracuse, October 11th and 12th. An interesting programme is published.

The Detroit Motor Company exhibited one of its machines, also a battery that is said to require little care, and may be used to operate the electric plugger and lamp.

The question that every man has to answer now-a-days is not "What do you know?" but "What can you do?" Know something you may; do something you must.

Dr. A. H. Thompson progressed his views as to the effect of function in modifying structure. His papers are among the most comprehensive known to modern dentistry.

The *Dental Review* should cultivate "A Sparrow," as should every other live dental periodical. His "Trials of the Country Dentist" is not only racy, but mighty near the truth.

The electric mouth lamp is useful as an instrument of physical diagnosis, and for a single purpose only. By its use the pulplessness of a human tooth cannot by any possible means escape you.

The Editor's letters from Europe to the *Fort Wayne Journal of Medical Sciences* keep its readers fully informed as to his whereabouts and the interesting things, social and scientific, that he is privileged to see.

Dr. G. V. Black's "reverse pluggers" were shown for the first time and excited much comment, questionable and otherwise. To handle them properly would make it necessary for most practitioners to learn new tricks.

To every creature nature added a little violence of direction in its proper path, a shove to put it on its way; in every instance, a slight generosity, a drop too much. Without a spice of bigot and fanatic, no excitement, no efficiency.—*Emerson.*

Dr. G. V. Black's elaborate article in the *Independent Practitioner* for September, on "Recent Theories on the Formation of Pus," ought to put an end to further question as to what it is. No abler presentation of the subject can be found in dental literature.

Dr. H. J. McKellops, of St. Louis, is said to have the best dental library possible "in this or any other land." It begins with a Sixteenth century translation of Ambrose Parie's famous work, and ends with the current issue of the ODONTOGRAPHIC JOURNAL.

The Bausch & Lomb Optical Company has issued the eleventh edition of their illustrated catalogue. It contains much that is new both in illustrations and descriptive matter, and is not only exceeding useful but highly artistic, especially the new-departure cover.

Seabury & Johnson's display of dental specialties—absorbent cotton, absorbent lint, rubber dam, antiseptics, disinfectants, etc., elicited much favorable comment, and the firm's habit of "sampling" every one who happened to call, fixed the firm's name and goods for all time.

It is said that a recent estimate shows that of the population of New York, Boston, and London, one-fourth; Philadelphia, one-fifth; Liverpool, one-half, receive free treatment at medical clinics. And yet some of the poor devils pay dearly for what they get, though not in cash.

See to it that the American System of Dentistry has a place in your library. It may be had directly of the publishers, Lea Brothers & Co., Philadelphia, or through the dental depots. It comes in three styles of binding—cloth, sheep, and half-morrocco, 18, 21 and 24 dollars respectively.

Mr. R. S. Williams was on hand as usual with a large exhibit of gold. His latest "fad" is gold that has under the plugger point a spreading property. Many demonstrated on the spot all that he claimed for it, and congratulated themselves on being able to add another form of gold to their list of filling materials.

The Doctor says—"Medical colleges, fond as the profession is of reproaching them, have done more for the scientific education of medical men in our country than all (other) courses combined." And let us not forget that the same thing is true of dental colleges, bad as some of them are after a fashion made out to be.

Lime liniment, or Carron oil (in allusion to its use by the iron-workers of Carron), is a mixture of lime-water, and either linseed oil or olive oil in about equal proportions. It is a favorite application to burns. Syrup of lime may be used instead of lime-water when great dilution is not requisite.—*American System of Dentistry.*

Again there seems to be a lull in the dental arena. Personally we are a peace-man—peace at any price that is not too high, and yet there is little that pleases us more than to see others engaged in fighting a good fight. Come, ye pugnacious of the profession, and afford a numerous company a little diversion! Again we say—Kome!

Dr. O. Carpenter, of 1169 Broadway, Oakland, Cal., has devised a clamp especially for facilitating the filling of cavities at or near the gum, and beyond which it is well nigh impossible by other means to force and retain the sheet-rubber. This is a screw clamp with adjustable malleable iron jaws. It very nearly if not quite fills the traditional "long felt want."

The Eighth District Society is getting things in good form for the coming union meeting to be held in Buffalo the last Tuesday of the current month. Western New York generally will be represented, also a goodly part of the Province of Ontario. Let every man who hears of it cut from his appointment book at least two whole days. Dr. C. S. Butler is chairman of the business committee.

To the Editor :—"What in —— do we want of articles on the microscope, symposiums, photography, etc? Give us something else."

All right, my dear fellow; we are getting out a series of recipes for mixing plaster of Paris, warming wax, and sand-papering rubber plates. Only have a little patience and we'll reach your case.

"My dear," said his wife, "why do they keep that hen on exhibition at the bird dealers? I don't see that its any different from the ordinary fowl."

"Well, well; didn't you notice? That hen is one of the most interesting features of the whole collection. It hasn't any teeth."

"Is it possible? I must go and look at it again. Good gracious? No teeth!"

The *Independent Practitioner* plays with the word "symposium," a word that figured largely in papers and discussions at the meeting of the State Society at Albany in May last, and says something thing about "sugar," and quotes one Webster to show that "symposium" and "drinking-bout" bear some relationship, which may be all right enough in its way; but, Who is this Webster? Where does he live? What does he do? What does he know about dentistry anyhow?

The Buffalo Medical and Surgical Reporter comes as regularly as rent day, and with a table of contents as rich as it is varied. The September number has a contribution on the "Treatment of Burns," by Dr. George E. Fell, who, by the way, came mighty near slipping into dentistry, but thought a little longer and better of it, and became a medicus. The doctor found in his treatment of numerous cases from the Richmond hotel fire that a powder of equal parts of iodoform and starch thoroughly dusted into the wound and flooded with Carron oil effected the best results.

The Southern Dental Association by invitation of the Virginia State Dental Association, met at Old Point Comfort, Tuesday, August 30th, and began one of the best meetings known in the history of Southern dental societies. Ten full committees, thirty-three clinical operators, and a host of members and friends made things lively at the Hygeie, whose genial manager more than fulfilled his promise to lay Chesapeake Bay and the whole of the surrounding country under contribution for the comfort of his guests. This same society meets with the American Dental Association at the same place next August.

BOOKS, PAMPHLETS, ETC.

AMERICAN SYSTEM OF DENTISTRY. In Treatises by Various Authors. Edited by Wilbur F. Ltch, M. D., D. D. S., Philadelphia: Lea Brothers & Co. Vol. III., Pp. 1059.

The third and last volume of this splendid work is divided into seven parts, the first treating of Anæsthesia and Anæsthetics; the second, of the Physiology of Digestion, and of Voice and Speech; the third, of Diseases Incident to the first Dentition, Causes of Congenital Defectiveness and Deformity of the Teeth, Anomalies of the Teeth and Maxillæ; Hypercementosis; Reflex Neuroses as ociated with Dental Pathology; inflammation of the Mucus Membrane of the Oral, Nasal, and Pharyngeal Cavities; Oral Surgery; fourth, the Eruption and Structural Relations of the Deciduous and Permanent Teeth; fifth, Materia Medica and Therapeutics, sixth, Metallurgy; seventh, Jurisprudence.

The names of the several contributors are well-known, with an exception or two, to readers of dental periodicals—Brubaker, Guilford, Kirk, Leffman, Litch, Pierce, Sudduth, Thompson, White, and Tiffany, Seiler, Packard and Garrison. Dr. Tiffany is professor of surgery in the University of Maryland, Dr. Seiler is a laryngologist, Dr. Packard, a surgeon, both of Philadelphia, and Dr. Garrison is a member of the New Jersey bar.

From beginning to end, everything possible has been done by editor, colaborators and publishers, to make the American System of Dentistry a literary, scientific and financial success. Of the first and second there can be no question; of the last, Lea Brothers & Co.'s reputation for thoroughness in all hat pertains to book publishing, including intelligent canvassing, makes it more than probable that they are well pleased with its reception by the dental profession.

THE
Odontographic Journal.

VOLUME VIII.—*January, 1888.*—*No.* 4.

CORRESPONDENCE.

BY W. H. ATKINSON, M. D., D. D. S., NEW YORK.

[Read before the Dental Society of the State of New York.]

The result of the circular issued last year shows a very discouraging status of the profession at large. To all of the circulars sent out but two replies have been received, although several promises were made that full replies would be sent. The intent of your correspondent last year to open a way for a general comparison of individual methods does not seem to have been comprehended. At any rate, the lack of interest displayed in making an *attempt* to deal with even the *practical* questions propounded is sad evidence of there still being the old-time secretive feeling amongst the great majority of us. It is hard to have to believe that, however ready dentists are to benefit by the clinics which public spirirted men offer to them, most of them will hug to themselves their little kinks of practice, and hesitate to say what they believe to be reasons and issues, for fear some one may say "you are wrong." Suppose we *are* wrong, *are* we infallible? Can we not learn more? Or do we think that to pool all of the knowledge we possess, and to assemble our several methods, might help some poor ignorant devil to better? I would suggest again to this Society the feasibility of considering this general plan of collecting what we think we know, comparing year after year the results of our several trials of the new things we hear of, through the publication of the answers received, and gradually reach a surer foundation of diagnosis, prognosis and treatment. The announced plan of the Dental College Association to pool their efforts in issuing a series of text books carries out this idea from a limited stand point. Each one of you may have some little thought of value which will help others in the same way it has helped you. Let us have it. Your older brethern have helped you, now let the fresh blood show forth and be heard to help them. Many of us follow special lines of practice, and therefore practical details of other branches do not come to us readily. Mutual aid can benefit us all. Are we still to see the individual light hidden under the individual bushel? One dentist of all in New York sees, as he expresses it, his "duty," and answers, and very well, too, let me say; and of the rest of these great United States one earnest man in the West comes forward to do his share. And these are all. I would suggest that the two answers received be published. Is the matter to end here? Can *another* plan be suggested to bring out a continuous interchange of views and methods which can be from year to year discussed. If so, let us have it. It will to some extent establish a post graduate system of instruction, and perhaps lead to a bureau of dental information of great value. The successive publication of the sorted answers will in themselves form a constantly-new text book for students. Let us awake to a careful consideration of this next best plan to clinical instruction, and bring it into practical working order, and so set the example in this as we have in society clinical instruction. Let us be earnest for the good of all and thereby for the good of ourselves. As to general correspondence some queries properly belonging to the Board of Censors have been received, and the writers thereof have been referred to their respective district censors for the information asked. There has also been some *correspondence* possibly directed to the writer as *Correspondent*, but which were properly personal consultations, and which have been treated as such, although, allow me to say, without pecuniary benefit to myself. In ansewer to "Correspondence Circular to the members of the Dental Profession, with an earnest request that each one who receives it will reply to such questions as he will, and refer to each by number and mail to the Correspondent of the Dental Society of the State of New York, W. H. Atkinson, M. D., D. D. S., 41 East 9th Street, New York City," I have received the following

BY M. J. D., RICHFIELD SPA., N. Y.

1. What is decay, and upon what does it depend?

A retrograde metamorphosis of the organic or inorganic structure of a body, dependent upon a lack of vitality, or the action of an influence exterior to itself and possessing a chemical affinity stronger than the original combination, or both.

2. (*a*) Trace caries of a tooth, minutely, from its beginning to its regression to an abscessed condition, giving in detail the steps in the tooth and its surroundings in retrogressive metamorphosis, with (*b*) the treatment you would follow as each stage is reached, (*c*) and the explanations for the progression of the disease, (*d*) with its abortion if a possibility, (*e*) and if at any point or points of its progress systemic restoration or termination of the inflammatory process be possible, please so state and how. (*f*) When the disease, as such, be brought to a terminus, what is the further history of the minute anatomy of the tooth and its neighborhood under the treatment you pursue ?

To trace caries of a tooth from its inception, a consideration of the conditions that lead to the cause is essential. Without a knowledge of the etiology in the premises no pathological condition can be combatted intelligently.

Various and conflicting are the theories now held with reference to the cause of dental caries. Sufficient for our present purpose, however, will it be to state that it is the opinion of the writer that it will be found a purely chemical process, a molecular re-arrangement co-existant with the so-called vital, electrical, or septic concomitant manifestations.

Again, to follow minutely the progress of caries step by step from its beginning, conditions that are conducive to such a retrograde movement may be arranged in two classes of predisposing causes, viz.: Systemic and local, under which heads are considered the structure, form and position of a tooth.

Generally speaking, local predisposition differs widely from the systemic classification in being circumscribed in its results ; whereas the latter, due to deranged functional activity, resulting in a vitiated condition of the secretions of the various glands having their points of exit within the oral cavity, have a most disastrous effect upon the whole dental surface, notably in cases of rachitis.

Active caries does not exist in a dry tooth.

Who has not noticed the striking difference in the appearance of teeth after they have become dry, out of the mouth. Those who preserve such teeth as a guide in the selection of artificial substitutes find them useful only as regards general form and outline. The same may be observed with the teeth *in situ*, where the rubber dam has been applied for some length of time.

Exposed to the air the teeth lose that translucent appearance characteristic of the immersed organ, which, however, is quickly restored on coming again in contact with saliva, demonstrating the absorbent quality of tooth structure, a fact even more readily shown by carefully weighing a dry tooth before and after immersion in saliva.

Chemical reagents present in the saliva will exert an influence upon the teeth when conditions are favorable, and are, undoubtedly, where not existing in a free state, separated from the fluids of the mouth and penetrate tooth structure by transudation or dialysis, the organic structure being the probable medium of action, as the destructive agent is seen advancing only in the direction of the longitudinal axis of the columnar arrangement of the enamel prisms, and over an area corresponding to the extent of exposure to stagnant saliva, progressing in ratio with the density of structure impeding its advance. A mechanical injury or faulty structure facilitates the action, and subsequent loss of enamel is usually occasioned by fracture.

Such, then, is our opinion of the beginning of dental caries. Its birth is but a graphic history of its life, which clinically, differs in degree.

Following the course of its progress, we discern four distinct stages of decay :

1st. No perceptible cavities.
2d. Superficial.
3d. Simple.
4th. Deep Seated.

1st. The incipient stage, sensitive and aggravated by mechanical contact, sweets, sours, etc.

2d. That condition of the parts which permits the removal of decay by the aid of polishing tapes, files and other instruments.

3d. That degree of disintegration that may be designated a cavity, where excavation and filling first become a necessity to the arrest of decay.

4th. Where disease has extended so far as to involve, or be liable to involve the pulp, either by near approach of decay, the process of excavating and filling, or as a result of either of these operations.

As soon as a decided cavity is formed, decay proceeds with increased activity owing to the greater facilities afforded for chemical action by reason of the reservoir formed by its walls, wherein accumulate debris of food, tooth structure, micro-organisms, etc.

Proportionate with the amount of decomposing agent present is the progress of decay increased or diminished, in most cases the organic constituents being last to yield. This feature is characteristic of all the subsequent stages of decay, it being borne in mind that the same transudation noticed in the inception of caries preceeds actual decay, and may be seen by aid of the microscope in advance of the so-termed "septic invasion."

Where caries has progressed to the fourth stage, more or less irritation may be created by contact of the vitiated fluids, permeating the dentine in advance of the decay, with the delicate structure of the pulp, which, being highly vascular, receeds, depositing secondary dentine as protection to itself.

Abscessed Condition.—If, however, from lack of necessary lime salts or the too rapid advance of decay, some mechanical injury, or other cause, too great an irritation is induced, congestion and decomposition of the pulp take place, resulting in the formation of morbific gases which, escaping through the apical foramen, become an irritant to the surrounding tissues which nature seeks to confine and accommodate herself to by forming a wall of circumvalation from the organizable exudate of the inflammation caused by the presence of the irritant, by the same process that a bullet or other foreign body becomes encysted. The continued accumulation of the irritating cause results in an enlargement of the area of the sac so formed, until consequent pressure upon the surrounding cancellated structure, always in the direction of the least resistance, causes it to break through the alveolar plate forming a sinus for the escape of the irritant and the pus by which nature seeks to float it away, the sinus pointing within the oral cavity, excepting where the break in the alveolar wall is beneath the tendon or sheath of a muscle, in which case the sinus is liable to point externally, and may burrow beneath the muscle for some distance before coming to the surface.

Symptoms—Soreness, pain, heat and swelling.

Alvelor abscess is not necessarily a concomitant of caries, but may arise from a variety of causes exterior to and independent of the pulp or contents of the pulp cavity, but only in rare instances. Then again it may occur from putrescent pulps without the violent symptoms of the acute phase of the disease, take on a chronic form, discharging its sanies through the pulp canal into the mouth, thus relieving the the pressure and consequent pain and swelling.

For treatment, alveolar abscess may be divided into two classes:—

First, those with open sinus ; second, those without sinus.

The former is the rule where there exists no break in the walls of the pulp chamber and canal ; the latter, the opposite condition, is due either to the ravages of decay or the drilling of a tap-hole for temporary relief.

Cases not infrequently present themselves that belong to both classes.

(*b*) *Treatment.*—First stage of decay.—(*a.*) Locally, use of ant-acid treatment, abstinance from use of sweets, acid fruits and drinks, and care as to galvanic influences. Have had occasion to use cauterants of which zinc chloride has proven most effectual.

b. Systemically by frequent exhibition of small doses of sodium bi-carbonate.

Superficial Caries.—Removal of diseased parts by use of files, tapes, etc., where liability to decay may by such means be corrected; where otherwise, it should be left to pass to the next stage.

Simple Caries.—Excavate thoroughly, dry the cavity and fill *so as to exclude moisture.*

Deep Seated Caries.—Gently wash out cavity with stream of tepid water, repeating its application frequently as the preparation of the cavity proceeds. Excavate from within outwardly, being careful not to remove natural covering of pulp; rather leave a portion of decalcified dentine than risk exposing the pulp by its removal. Use no disinfectant or antiseptic agents, nor other means whereby albuminoids may become coagulated, thereby preventing recalcification. Simply dry the cavity thoroughly and fill with a neutral *plastic* material, which should be left until dense enough to resist the impact of a gold or other suitable filling. Should pulp combinations present an attempt should by all means be made toward the reduction of all inflammatory tendency before filling.

The treatment of abscessed conditions of either class is therapeutically identical, the primary object being *thorough* disinfectant or antiseptic treatment, followed by stimulation to the breaking up of the pyrogenic membrane forming the pus sac, together with the thorough stopping of the new canal and pulp cavity.

The latter can usually be accomplished at the first sitting in cases belonging to Class 1 ; but those cases included in the second class are often very obstinate, and yield only after repeated stopping and unstopping of the canal, and as frequent medication.

(*c*) The explanation of progression of the disease is that the extreme paucity of the elements of recuperation in the parts affected renders repair of the ravages of decay impossible by natural processes, so that when once begun it proceeds with uninterrupted sway until the destruction of the tooth is accomplished or its course arrested, the mode of treatment indicated by the individual conditions of the case.

(*d*) The abortion of alveolar abscess is possible when inflammation has not been carried to suppuration. Indeed many putrescent pulps have been treated successfully where disease had not proceeded to pericemental complication, which if left would eventually have terminated in abscess.

(*e*) No systemic treatment will arrest caries of a tooth. In the case of an alveolar abscess, however, the conditions are different. A general and local antiphlogistic treatment will frequently terminate the inflammatory process and bring about resolution to normal conditions, the success of such treatment being augmented or retarded by temperamental and systemic influences.

(*f*) Previous disease may be considered as predisposing to a return. But where properly treated the *probabilities* are in favor of its not returning.

An abscessed tooth, in which there is no impairment of its pericementum and which has been properly handled, its pulp cavity and nerve canal so filled as to afford no lodgement for putrescent matter, is to all intents and purposes as good as its neighbor, being sufficiently nourished by the pericementum to maintain a degree of vitality commensurate with the requirements of the case.

3. What material do you use for fillings, and why special kinds for special cases ?

Gold foil, alloys, gutta percha and cements according to circumstances, such as character and location of cavity, structure and position of tooth, pulp complications and ability or willingness on part of patient to pay for the operation, etc. Gold in its various forms takes precedence by reason of the greater skill required in its manipulation, its permanency, beauty and general adaptability.

Alloys, because of the ease with which they are packed, of thereby securing the salvation from oblivion many frail teeth that would either be utterly neglected, or would not withstand the force of impact necessary to properly condense a gold filling.

Gutta percha, for its property of neutrality as to thermal and galvanic influences; and cements, for restoration of color, strengthening frail walls, bridging over caps and for temporary fillings.

4. Do you combine any different materials in filling teeth, if so, what and for what purpose?

Two or more materials are frequently made use of in filling cavities of decay where their several distinctive characteristics are found to be requisite to the conservation of the parts under treatment.

5. Do you use rubber dam in operating on the teeth; if so, how do you apply it?

The rubber dam is of frequent use, and with much less inconvenience to both patient and operator in prolonged opperations. Applied with the ligature.

6 (*a*) Do you use amalgam; if so, to what extent, (*b*) under what circumstances, (*c*) of what composition or of whose make; (*d*) how do you prepare it and how do you insert it; (*e*) how do you prepare the cavity for it, (*f*) and if you have any special practice in this direction please detail it and give the results of your amalgam work?

I do use amalgam to a considerable extent (*b*) where conditions require, and where patients are not willing to undergo the expense of a better operation. (*c*) Largely of silver and tin in bimetallic alloys, but mostly of the higher grades of three and four metals containing zinc in small proportion. (*d*) Prepare by adding the requisite amount of mercury to the alloy and rubbing smooth in a mortar, insert in small particles and rub or pat into position by the use of points adapted to the purpose. (*e*) With care, cutting out all sulci leading to or from the cavity, which is given a spherical form as near as may be, (*f*) *patting* excess of mercury to the surface and removing by repeated applcations of "wafered" particles of residue of filling material, which is as often removed, until a dry dense surface is obtained. Finish by wiping with pellet of absorbent cotton from center towards periphery, and burnishing. The cervical borders of approximal fillings are best finished by the use of cotton tape carefully drawn between the teeth and followed with a suitable burnisher.

7. Do you use any separator; if so, for what purpose, and how and what kind or kinds, and what are the results?

Do use a two-bar Perry separator occasionally to good advantage; but where rapid wedging is not absolutely necessary prefer a slower method by the use of *raw* cotton in pellets or tape.

8. Do you use any form of matrix; if so, for what purpose, and how and what kind or kinds, and what are the results?

Am not wedded to any form of matrix. Dare not trust them except in rare instances.

9. Do you use arsenic; does it effect the purpose you had intended ?

Yes; very seldom, but eventually with success.

10. (*a*) What is your practice in treating exposed pulps, from beginning to end ; (*b*) give remedies and operative treatment ?

(*a*) Protection, nonirritative, conservative. (*b*) Depending upon *temperamental*, systemic and local indications.

11. How do you recognize an inflamed pulp ?

By a throbbing pain ; when exposed, by its turgid appearance and protrusion from pulp cavity.

12. Is a pulpless tooth an injury to the mouth ?

It is, excepting when properly treated.

13. If so, how, and how long do they last ?

By predisposing to alveolar abscess. The primary cause of the devitalization of the pulp, whether by approach of decay or a mechanical injury to the tooth determining in great measure the duration of its period of usefulness.

14. What is a pulp stone ?

A deposit of secondary dentine.

15. How is it formed ?

By action of odontoblasts in the same manner as the primary dentine, superinduced by some irritating cause.

16. Can it be remedied; if so, how ?

Very difficult to diagnose. Extripation of the pulp the only relief known to writer. Do not know of a remedy.

17. What is your practice for placing artificial crowns ?

The How system meets necessities in greatest number of cases by reason of its readiness of adaptation and low price. As a better order of work the crown *a la* Richmond is the most satisfactory in my experience.

18. What method do you prefer for correcting irregularities ?

Have no special favorite; am governed by requirements and susceptibility of case.

19. What systemic conditions have effect on the teeth ?

Deranged functional activity of digestive organs produce action upon the teeth after eruption, by vitiating the product of the various secretory glands discharging into the oral cavity, notably in cases of rachitis of children. Previous to eruption the enamel, being of epithetial origin, is frequently injured by diseases involving the epithelial structure of the body.

20. What systemic effects have diseased teeth ?

Deleterious effects. 1st. By affording lodgement for putrescent particles of food, etc., thereby vitiating the saliva. 2d. By destroying the masticating surfaces intended for the proper comminution and insalivation of food, perverting the functions of digestion and assimilation.

21. What do you understand by inflammation ?

An excess of blood in a part, caused by a general or local irritant, that may result in suppuration or resolution, the effusions of true inflammation being organizable in contradistinction to those of congestion.

22. What is the disease called pyorrhœa alveolaris ?

An obstinate and widely prevailing affection of the tissues surrounding the roots of the teeth, which, if neglected, sooner or later results in the loss of the teeth.

23. What tissue or tissues are affected by it ?

The pericementum and alveoli.

24. What is your method for diagnosis of pyorrhœa alveolaris.

Fetid breath, turgid and swollen gum, exudation of pus at gingeval border, soreness and looseness of affected tooth, with deep pockets dipping towards the apex of the root between the cementum and the socket, often closely filled with flinty granulations of calcarious deposit closely adherent to the cementum.

25. What is your opinion of local anesthesia, and what anesthetic, if any, do you use, and what are the results ?

Distinguishing between "obtundants" and local anæsthetics, my opinion is not favorable except that the imagination of the patient can be enlisted. Have had very little success with cocaine muriate in solutions of less than 20 per cent.. Ether spray is of use, but unsatisfactory. For extractions a mixture of equal parts of chloroform and aconite root tincture has become a standard local anæsthetic with the writer.

26. (*a*) To what diseased conditions is the antrum liable, (*b*) how do you diagnose and (*c*) treat them, and (*d*) what results do you obtain ?

(*a*) Inflammation of its mucus membrane, necrosis, and pointing of alveolar abscess; (*b*) pain, sense of fullness or heaviness when the head is inclined forward, bulging of floor of orbital cavity with consequent soreness of orbit, sense of pressure and bulging of floor of antrum in region of hard palate, fetid discharge from nostril of side diseased. (*c*) Locally or systemically or both, according to indications ; (*d*) good.

27. How do you diagnose "necrosis."

By probing, character of discharge, and by the "tit-like" formation at opening of sinus—characteristic of necrosis.

28. (*a*) What is your treatment? (*b*) Do you use the sponge graft for the reproduction of lost tissue, and what is your method?

(*a*) Stimulative. (*b*) Have had very little experience with sponge graft, which may account for my not having been successful in its use.

29. What is the action of creasote?

Varying from a gentle stimulant to a powerful escharotic; disenfectant and antiseptic.

A. H. T., D. D. S., TOPEKA, KANSAS.

1. Decay of the teeth is a chemical process caused by the solution of the lime salts of the dentine and enamel by an acid solvent.

(*a*) It originates in the enamel, upon the surface or in a crevice, causing a breaking down of the enamel at that point, (*c*) the solution and removal of the liquid products of dissolution, the progression and extension of the action continues until the pulp is exposed, this becomes congested in consequence, inflammation and pain ensue, the tissue dies and decomposes, the products of decomposition are forced through the apical foramen which causes an inflammation of the pericementum, and this results in congestion, hypertrophy and abscess. (*b*) For treatment I would at the first stages remove the disintegrated surface from the enamel, if on an approximal surface, next fill the cavity when this is formed, which stops the disease by excluding the cause, *i. e.*, the acid fluids which result from the fermentation of any substance. (*e*) Systemic treatment for the healing of the tooth substance is of no account. Systemic treatment for the termination of pericementitis is often successful *i. e.*, a brisk saline cathartic to lessen blood force, and cool, thin and neutralize the blood, will often reduce congestion and abort a threatening abscess. (*f*) Under filling the tubuli usually ossify, or the contents mummify and the live protoplasm recedes. After death of the pulp the tubuli contents mummify, or decompose or form permanent compounds with medicines used. For treatment of dead pulp I should have said in the proper place, that I would remove the contents as soon as dead, wash with alcohol, and dress every few days with carbolic acid, or carbolic acid and iodoform for ulceration, and as soon as cured fill with gutta percha points.

3. Gold usually, amalgam and cements for special cases.

I use tin at the cervical margins of proximate cavities of bicuspids and molars because. its chemical changes preserve the teeth substance at this most vunerable point better than gold. Use cement in deep cavities to preserve weak tooth substance, and in soft teeth to preserve them better under metals.

4. Yes, applied with waxed silk and held with clamp where necessary.

(*a*) Yes, to a limited extent, (*b*) in badly broken down molars and bicuspids, or inaccessible cavities in these teeth, or in very soft teeth. (*c*) Arringtons, (*d*) mixed in motar and inserted rather dry and stiff. (*e*) Cut freely and preserve as much tooth substance as possible. (*f*) No—results good.

7. No: think the forcible separation of teeth by these appliances lifts the tooth in the socket and will in time result in a crop of dead pulps to the user. They will also cause death of the pericementum and absorption of the alveolus and final loosening and exfoliation of the tooth.

8. No.

9. Yes; usually does the work, but needs reapplying sometimes.

10. (*a*) Quiet by soothing applications as carbolic acid, and after a few days, when quiet, lay paper wet with carbolic acid over exposure, and fill lightly with zinc phosphate cement. If it remains quiet for one or two months, remove part of the cement and fill with metal.

11. Pain.

12. No, not in good organizations.

13. Depends on organization, often 20 years.

14. Pulp "stone" is "stone" in the pulp, not in the bladder.

15. Calcification from the centre.

16. No. Kill pulp and remove "stones" and all.

17. Tube teeth with How screws for anterior, and Patrick system of gold crowns for posterior, both attached with cement.

18. Plates with springs, wedging, and bands of rubber; sometimes jack screws.

19. All conditions that induce phosphate poverty in the tissues.

20. Pyorrhea alveolaris, scorbutis, syphilis, etc.,—the question is indefinite, cannot guess if it means disease or not.

21. Aggregation of blood corpuscles and plasma, with or without rupture of the capillaries.

22. Local manifestation of general tissual degeneracy.

23. Primarily the percementum, following this and secondarily the alveolar walls and gum margins.

24. In the first stages calculus of both varieties, then suppuration about the necks of the teeth, with a history, more or less general debility, with gastric weakness or disease.

25. Have found nothing of sufficient efficacy to employ constantly, think it should be discovered.

26. (*a*) Abscess from penetrating roots of teeth, or blow (or exposure to excessive cold in low organization), infiltration and engorgement, etc. (*b*) By various simple signs, such as fullness, throbbing upon turning head, etc. (*c*) Evacuation of contents and antisepticand healing treatment. (*d*) Good.

27. Presence of dead bone.

28. Removal of dead bone, antiseptic and healing treatment, tonics, etc. (*b*) No.

29. Escharotic, antiseptic, etc.

"SYMPOSIUM A."—DISCUSSION.*

Dr. J. Morgan Howe—Briefly referring to some of the criticisms of my friend Dr. Stockwell, the idea suggested seems reasonable, allowing that a complete removal of septic matter and debris is desirable from the canal of a tooth in condition of acute inflammation; but my experience is that when a vent gives relief, further interference may, and often does cause renewed irritation, if indulged in before the inflammation has considerably subsided. When relief from acute pain is obtained better let well enough alone.

The practice which Dr. S. has the honor of originating, of proceeding to fill the root of a tooth with a blind abscess at its apex after he has removed as far as possible all septic agents from the canal and abscess, is what I particularly desired to call in question, I have been much interested in his experience, and apparent success, but it seems to me to be a reversal of one of the cardinal doctrines of modern surgery, that suppuration should be regarded as ended because pus and septic agents have been once thoroughly removed. Even if we admit the truth of the new doctrine (not yet published) that bacteria are as necessary to suppuration as to putrefaction, we must conclude that these organisms reached the apex of the root through the circulation in the case under consideration, of a blind abscess occurring in connection with a tooth with unbroken walls, so that the canal is sealed except at the apex, and *that this may occur again.* Is it not more likely to occur if the tissues surrounding the root apex have not been healed before filling? I think it is, and that recurrence of inflammation in connection with teeth whose roots have been filled, may be attributed to any condition favoring proliferation of organisms in the tissues or in the root canal. Complete obliteration of an abscess cavity by secondary tissue, and then complete filling of the root canal, seems to me the safest order of proceedure.

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*See Page 75, ODONTOGRAPHIC JOURNAL for July [illegible]

Dr. Stockwell raises a point against creosote, on account of escharotic and coagulating properties. Pure wood creosote is so little of an escharotic that it will not form an eschar on the oral mucous membrane, or has not when I have repeatedly tried it, and its coagulating effects on albumen are very slow and feeble; but it is so much of an anodyne that it will sometimes relieve the pain in these cases, and that is what is most desired, at least by the patient. The common idea of escharotic and coagulating properties attributed to creosote, is due almost entirely to the use of an impure article containing carbolic acid. The latter has these properties in a marked degree, the former hardly at all.

Then in regard to the properties of gutta percha, Dr. S. thinks it swells! That I admit is true, but it *shrinks first.* The shrinkage permits ingress of fluid, which is then absorbed, causing the gutta percha to expand, sometimes with great force. I do not doubt the value of this material as a root filling, but it is a value inferior to other substances that will not absorb. The purpose of a root filling is to exclude everything else so far as that is possible, and is then the greatest safeguard against such unwelcome results. I think Dr. Stockwell's theory and practice fail to take account of the access of bacteria through the circulation, and is therefore at least open to question; and this question I have raised not to be dogmatic, I know too little for that, but to have the truth revealed, as far as may be, by mental friction.

My friend Dr. Clark seems to have been so delightfully taken up with his reminiscences of youthful berry hunts, that he failed to read my paper carefully enough to fairly consider it. He says for instance that I *advocate* almost every mode of practice, and have called Drs. Jack and Truman, and almost the whole *American System of Dentistry* to my aid, whereas I quote Drs. Jack and Truman only to establish my premises in regard to the difficulty and danger of dealing with a certain class of pulpless teeth, and refer to the treatment of these representative men to show wherein I differ with them. I refer to one point only in the *American System of Dentistry* to commend the author's views, and that is merely that the value of constitutional treatment is recognized. He intimates that I suggest the use of creosote, iodoform and opium *together*, and says they will not work in harmony. And then, apparently because No. 2 says so, he repeats that creosote is an escharotic. If he will allow me I will give him some pure wood creosote, and he can try to produce an eschar with it. But I cannot follow my friend in all his vagaries; he started off on a blackberry excursion and his elation at his success has so turned his head, that he fails to catch many of the points of my more prosy subject.

Both my critics slip off my points, especially that in regard to the condition of quiescent pulpless teeth needing to be opened. They are like boys who want to guess the conundrum, and say "*Give us something easy*," and so get on the subject of alveolar abscess *with fistulæ*, which is specially excluded from the title of the paper. But I leave the subject for the present with much satisfaction, that your committee has done me the honor of selecting two such able and representative men to review my effort, and thanks for your kind attention.

Dr. J. G. Morey: There is a great deal of talk in these papers about the different methods of treatment, but the fundamental principle has not been touched upon. They tell you to remove the debris from the root, but how to do that they do not tell you. They say you must be very careful for fear of cutting through the apical foramen, etc. The removing the debris from the canal is purely mechanical, and it does not make any difference whether the root is crooked or straight. The instrument that removes the debris from the root must not cut around the root, but must cut lengthwise or horizontally, and the debris must be removed as you cut. No small drill should be used at first, because if you use a small drill and then a large, the debris is forced in; but with a large drill first, then a small drill, you reach the apex of the root without clogging it, or forcing debris through the foramen. I have repeatedly shown this. I will do it again and again to the satisfaction of anyone.

Dr. A. H. Brockway: The points I wish to make are these:—that in the treatment of cases like those under consideration, my experience is that the first step should be to get free access to the pulp chamber and root canal; the second, to wash out all the debris with water,—not with cold water, not with warm water simply as has been suggested, but with hot water,—hot as can be borne and with the rubber dam in place, which should always be employed where hot water is used. Why do I use hot water? For two purposes: as a solvent and as a germicidal agent. You speak favorably of iodoform. I believe there is not a better germicide than hot water. I think it the most valuable thing for the purpose, and it seems to me that it has been entirely overlooked in the discussion.

Dr. W. H. Dwinelle: I have been in the habit of treating pulpless teeth and abcessed teeth ever since I came into the profession. My methods are very simple, and I am willing to compare my success with anybody. I have two principles by which I am governed in treating teeth of this kind: The first is to get a vent; the second, drainage. These two principles have governed me throughout my professional life. After I have established them and have washed out the pulp cavities and disinfected them, I am then content to simply inject through the pulp cavity and the foramen of the tooth and through the gums, a solution of carbolic acid or creosote. If I can establish drainage, I can, in ninety-nine cases in a hundred effect a cure. I endeavor to aid nature in her efforts to dispose of foreign matter and if I have established this in the right degree, cure is sure to follow. I believe in the efficacy of carbolic acid and creosote. I do not use creosote as much as I did formerly, because carbolic acid seems to be, in my hands, a most excellent substitute for it. I endeavor to keep the foramen in a normal state, or as near to that as possible. If I can get a small broach through it I am satisfied.

A great many years ago, during my earlier career as a dentist, an incident occurred when all my efforts were tending to this matter. The idea struck me to use a hydrostatic process. Like Archimedes of old, I was ready to cry "Eureka." I adopted that system, and after adopting it, I kept my canals free from debris. Into some canals I could not get a broach, because, as well known to us all, they sometimes diverge at almost right angles. I filled my broach with creosote or carbolic acid, stopped the canal with rubber, and there let it stay for a short time, and then with a blunt instrument I would press upon it, and suddenly give it an impulse, and I was almost sure in every instance to find that the creosote had been injected to the the extremity of the root, and to the gum through the abscess, as indicated by the white color. I have seldom been obliged to use these means twice to effect a cure even in very bad cases of abscess. I believe in creosote, and I believe in carbolic acid. I think they are, together and singly, among the best agents we have for stimulating the tissues, inducing granulation and effecting cure.

I remember that a few years ago I was in Cincinnati, and in the office of Dr. Hunter. He had a large foramen to close, and it was not practicable, in his estimation, to close it in the ordinary way. It opened, as he said, and I believed it to be true, like a funnel, with the largest diameter at its extremity. Of course you cannot fill a tooth of that kind in the ordinary way. What did he do? He drilled a hole opposite the apex of the root and introduced a screw as a plug and then filled upon the plug closing the root in that way.

The matter of hydrostatic pressure I consider invaluable, and I had never heard of it before discovering it myself. Others may have discovered it before or since, but I never had even heard of it till that time in question.

A member: What do you fill the roots with?

Dr. Dwinelle: I have always filled them with gold. If the foramen is large I take a Swedish broach, take out its temper, and bring it down to that of a spring, and making a sort of hoe of it carefully carry it up till I reach the foramen. This I use as a guage, making all my filling instruments to correspond with it. I have root fillings to-day that were put in in the way mentioned in June, 1839. Of course I have used all the usual remedies, both in and about the tooth, but I have greatest faith in creosote and carbolic acid.

Dr. W. D. Nellis: It seems to me the authors of the papers have treated symptoms rather than disease. For instance, a person comes to you with an aching tooth, and antiseptics and washes and what not are resorted to bring about a cure, all but instantaneously. Now this is out of the question, and for the reason that the tissues have become accustomed to prevailing conditions—accepting, if you please, diseased material for building purpose. Now, in some instances, as I have found in my practice, it requires from one week to four weeks before this state of things can be changed. I remember one case of abscess which I had under treatment three to four months. I had tried everything I could think of, and finally in desperation took up a nostrum labelled "Organum," made a solution of it, and in two treatments effected a cure.

Dr. W. H. Atkinson : Short, to the point, and dogmatic, I believe, is the rule. A blind abscess should be treated like blind people. Give them eyes ; give them vent. Open them up to the disinfecting influences of the air and what else you please. Hew down into it and clear out the passages, and don't you forget it. Let all your mugwumpian ideas of filling go by the board. Be sure you are right and going straight to effect your purpose.

What is disinfecting ? What are antiseptics ? We have heard a great deal about them. All the substances named are simply agents that hold oxygen with a loose grip, so they can carry it into the territory where the greater vacancy exists and leave it on the ground. That is the sesame of the whole thing—this idea of holding the oxygen loosely and carrying it to the place in which it will do most good.

One thing that seems to haunt the minds of most of the speakers has not been clearly set forth,—how to fill a root that is curved, the foramen of which is larger than the main canal. Our friend Dwinelle puts a hook up there, finds where the end of the root is, and takes a measure. I say measure so that you shall not go through the end, and then with a stiff wire bur, made a little shorter than the tooth, carry the material to place.

One thing more, and that is, do not be afraid of mischief coming about from microbes and those kind of things. Green apples give the boys the bellyache, and those disturbing elements, the microbes, they say, give us the toothache. How much do we know about microbes ? Do we know anything of their life history ? Do we know anything of the results that will follow if we let them alone ? Are they always poison, or do they sometimes do good ? They say there must be microbes to make pus possible. Pus is dead blood. When the serum is killed it is not capable of being built into tissue. Suppose you have filled a tooth, and there comes a blind abscess, what have you got to do ? Just cut right into the seat of the mischief ; and let me say, gentlemen, if I never see you again, you had better cut fifty times when you do not need to than to forget to cut once when you do. When a pulp is dead you can cut *ad libstum* through gum, alveolar wall and all, and be sure you are not doing mischief.

Most of our difficulties come from our want of knowing what we say and saying what we know. It was said a minute since that pus is poisonous. Not so. It is sanies that is poisonous. Again, what is fermentation, and how much do we know about fermentation? The word means "boiling." What is boiling? It is a disturbance of molecules, a return to their elements, or change into other molecules of a less complex nature.

"LEGAL STATUS OF DENTISTS"—DISCUSSION.*

Dr G. W. Weld: I had a little experience some years ago that seems germane to the subject, and I would like to relate it. Some eleven years ago, when I first came to New York—and this relates to the partnership matters that Mr. Nason alluded to—I went into business with a gentleman of that city by the name of Dr. Smith. The understanding was, that he should supply the patients and I perform the operations, and that I should pay him one-half, and also that for all the patients I could call my own, I should pay him the same proportion. This arrangement continued, I think, some four years, when the partnership, or rather the association, was dissolved. I went to the Carltons, who at that time also published cards, and said to one of the clerks of my acquaintance that I wanted a card announcing my removal. He showed me some specimens and I selected one that simply stated I had removed to so and so, from East 23d street to such a number in another street, and also stated "of Drs. Smith & Weld." The first intimation I had that the card was objectionable, was an injunction from the Supreme Court, forbidding me to circulate the cards. The specimen I had seen was the removal card of Dr. Bumstead, of Bumstead & Taylor. It appears they had been in partnership, and had dissolved the same, and that Dr. Bumstead had had a card printed at this place, stating that he had removed, and mentioning Drs. Bumstead & Taylor. The card which I had printed was simply a copy of theirs—a facsimile in everything but the names and streets. Now I speak of this because I think it is proper to do so, and thus the statement may be of some use to others. Dr. Smith was in the habit of introducing me as his partner. Well, two gentlemen came forward and made affidavit that I had been introduced as a partner to them as patients. The injunction was dissolved. Afterwards I saw Dr. Smith and told him the circumstances, that I had seen the card at Carlton's, and not knowing there was any harm in it, had sent them out. I also saw Dr. Bumstead, and intimated to him indirectly, that he had got me into a little trouble, and then I told him the circumstances of the case. He in turn told me his story; how he sent out his cards, how Dr. Taylor objected, how he continued. Well, to make a long story short, I gave up the plate to Dr. Smith and the matter was settled in that way. I speak of it as showing how a person under such circumstances may get into trouble without knowing or intending to do injury to one with whom he has been associated.

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*See Page 149, ODONTOGRAPHIC JOURNAL for October '87.

Dr. C. W. Stainton : I understood Mr. Nason to say that where work had been performed upon a minor, that a cause of action would hold good.

Mr. Nason : It was so held by the Supreme Court of Connecticut. A minor was sued for work done upon his teeth ; they set up the defence of infancy, and the plaintiff, of necessity, and the Court held that the work was necessary and the minor liable. The minor was a ward, under a guardian, and a guardian, as you know, sustains the same relation as a parent. That is a Connecticut case. There is not a case on record in New York that I have been able to find. There may have been cases where the Court held it was necessary, and if I had a client of that kind I should certainly advise him to try it.

The President: I think there is in this paper information of the greatest importance to the whole profession. We have now and for the first time in history, a codification of the laws and decisions in regard to our patients, our students and ourselves. I may state that you are at liberty to add to your information by asking any questions you desire in regard to the paper, and you do not need to be assured of Mr. Nason's ability to answer them to your satisfaction.

Dr. W. H. Dwinelle : I think Mr. Nason is entitled to a great deal of congratulation for the very able paper he has read to-night ; the result of so much labor and legal research. Our profession has reached its present prominence almost within the memory of many of those present. We have been beneficient with reference to the law appertaining to our profession, and Mr. Nason has made a research in that direction, and given us the results to-night. We have been limited in our knowledge of the law, and many advantages have been taken of us on account of our ignorance of the law ; but the law that appertains to our profession is established. Law, as we all know, is made up of precedents that have become authority by reference to them and decisions upon them. Our profession has not been in existence long enough to have a very extensive code of authorities; but the paper which has been given us to-night will certainly put us in the way. Every decision that has been made in our favor advances us so much, and every decision against us is a retrograde step. I think we should all pursue these matters to the uttermost, until we get a favorable decision. I have had several illustrations of it personally. I have been sued, and I think I have beaten my opponents in every instance. It is because I have a degree of persistance that everyone does not possess. My mother did me the favor to name me William, and the analysis of the word William is, as you may know, "Will–I–am"—will, determination, persistence—so recorded far back in the myths of the north.

We have had several decisions within a few years against us, but not according to the principle of law, which is equity. State a case to me and I will decide it by the general principles of equity, and if you and I and all of us who understand the principles of equity decide it is equitable, then I will find you the law for it sooner or later. Mr. President, it would be impossible that in the two thousand years of civilization, reaching back to the old Roman law, that the principles of equity should not become a law of themselves. I have followed up that principle to the astonishment of my legal advisers, when they have told me I could not possibly succeed, and in three such cases that I now remember I have succeeded, because under that principle of justice it could not be otherwise.

I referred a moment ago to decisions made against us. One came up to-day. I wonder Mr. Nason did not refer to it. A decision was made against one of the best and oldest men in the profession. It was, of course, injustice; but unfortunately for us, and our future sorrow, he submitted to it. Had it been my case, I should have carried it to the Court of Appeals, and if there had been a Court of Heaven, I should have carried it there. I believe firmly that if he had carried it to the Court of Appeals, he would have gained his suit, and if so it would have been a feather in the cap of every man present.

I wish Mr. Nason had brought before us some decisions, and given us the history of those decisions, especially the history of those decisions against us, and shown us how it was that we had been beaten. I am very glad that this subject has been brought up to-night in this form, and by so able a man, and I have no doubt I voice the sentiment of every one here when I say we owe a debt of gratitude to Mr. Daniel Nason.

"DENTAL PRACTICE"—DISCUSSION.*

Dr. G. W. Weld: I would like to ask Dr. Brown in regard to the admixture of cocaine with arsenic.

Dr. E. Parmly Brown: I have been in the habit of making my own arsenical paste for many years. I have found that uniformly good results do not follow the application of a paste containing morphine. There would be extreme pain after the application, and from the literature of the subject I gather that morphine renders the latter inert. I mix arsenic with cocaine. You will have no trouble in getting them together, but when properly mixed and applied, you will have no cases of the severe pain so frequently met with in the morphine mixture.

Dr. Weld: I am glad to hear the statement of Dr. Brown, because it goes to prove that the therepeutical value of one agent may not be as good as another, as shown by clinical experience. It seems to me, from Dr. Brown's experience, that cocaine, which is not as good as morphine in some cases, is much better in others. As to arsenic destroying the value and effect of morphine, I must express some doubt, as I have found, when I have used morphine with arsenic, there has been no modification whatever.

Dr. Brown: I think we might harmonize our opinions, by ascertaining whether you use them separately or mixed in a paste. I have never used them separately.

Dr. Weld: I have always been in the habit of treating the pulp with creosote, if diseased at all, and then applying a paste of arsenic and morphine.

Dr. A. H. Brockway: When I hear these opinions of the effect of morphine and cocaine, I feel that there must be something about the agents themselves to account for the results. I have been in the habit of taking out pulps for a good many years, by applying to them a simple preparation of arsenic and creosote; I then remove the pulp painlessly. I take a piece of cotton and lay it gently upon the pulp, with the paste upon it, then I cover that with cotton, and that again with a little wax.

Dr. W. H. Dwinelle: I rise to endorse what has been said by Dr. Brockway. I have been in the habit of using a paste made of creosote, morphine and arsenic for the last forty years—I am a little modest about saying how many over forty—and I have never failed to devitalize a pulp without pain. I might say I have never had a painful result. It may be that the preparation I use differs from the preparations others use; but it has been my good fortune, during that period, to succeed in devitalizing pulps of teeth painlessly by the application in question. Arsenic is a caustic; the other two ingredients modify its caustic effects. Morphine is a sedative and qualifies the caustic character of the arsenic Creosote is a sedative also, but it has the peculiar quality of penetration, so to speak, and these three in combination effect a result, which in my experience in practice, has proven perfectly satisfactory. It has been hinted that that is the composition of these pastes substantially, that when fresh it is effective, but in course of time it becomes ineffective. I beg to contradict that statement, and, as an illustration, say that I have a very small vial of creosote, arsenic and morphine in combination, set aside in my operating room, that I mixed at least fifteen years ago, and I have not had occasion to mix any since. That the new agent, cocaine, will tend to modify and qualify, and possibly improve the old methods, is very possible—it is even very probable; but it is a new agent that we know little about, but for which great promises have been made. It has failed in some of its promises, but that it may be and will be a very important factor in daily practice I have no doubt.

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*From advance sheets of Transactions of the Dental Society of the State of New York, 1887.

Dr. W. L. Campbell: I would like to inquire what form of morphine you use?

Dr. Dwinelle: The sulphate; I presume, however, the acetate would be as effective.

Dr. M. L. Rhein: I have never had any failure in the use of cocaine where I have been able to introduce the point of a hypodermic syringe. I have for that purpose some very fine points, much finer than are usually made, and with the proper curves in them to enable me to reach the pulps of the posterior teeth, where a straight point would not answer.

I would like to speak about another matter, and that is in regard to the Herbst method. We find that two members of the committee are diametrically opposed upon this subject. Dr. Brown says in the report that he does not believe in the method at all., in its applicability to actual work; while Dr. Bodecker is reported as using no other method in the insertion of gold fillings. Both of these men are noted for their very excellent operative work; but how are the young men to judge of the merits of this system upon two such diverse reports. I have been using and experimenting with the

Herbst method ever since Dr. Bodecker brought the Wolrab gold from Germany, and from what I have learned, I am very much on both sides of the question. I really think that all members of the profession will derive great benefit from the use of this peculiar method and of this peculiar form of gold, in almost every operation ; not in the way, perhaps, that it was originally intended by Dr. Herbst, but in ways that their ingenuity will naturally suggest and in such ways as to save a great deal of time in many operations.

Dr. F. B Darby: Dr. Brown referred to the use of cocaine—some preparations of the drug not being good. There is a preparation of of the alkaloid itself in ether that will render the extraction of a pulp entirely painless.

Dr. Brockway: I would like to express my commendation and opinion of the value of the Perry separator. I think it is one of the most useful appliances brought to our notice in the last few years, and when used judiciously, is not subject to the criticisms made upon it. I wish to say also that Dr. Geran exhibited at a recent meeting in Brooklyn, a blow-pipe of very simple construction. I suggest that members apply to him for information in regard to it.

The President: I suggest further that Dr. Geran waste a few words in a description of this instrument.

Dr. J. P. Geran: I thank Dr. Brockway for mentioning the blow-pipe, but had no idea of bringing it before this society. It is simply a large bulb gas burner, without the jet, with a hole in the bulb on the outside, and a blow-pipe attached thereto. A rubber tube leads to the gas cylinder. I light the illuminating gas and gradually let in the nitrous oxide, and I can do as good work with it as with that of Dr. Knapp's. I am sorry to infringe on Dr. Knapp with so simple an idea ; but it is effective, simple and inexpensive, costing about ten cents.

Dr. F. A. Greene: I would like to say, in regard to the mixing of illuminating gas and nitrous oxide, that in the use of the ordinary blow-pipe, if you draw the nitrous oxide into the gasometer to reduce the pressure, and then put a weight on top and use the nitrous oxide instead of air, you will get the same effect as with Dr. Knapp's blow-pipe.

Dr. Dwinelle: Let me say one word. I do not think we should dispose of the report without saying more about the Herbst method. I think that the Herbst method has a great deal of merit in it, notwithstanding it has been so thoroughly condemned in the report.

As I said sometime ago, I think he has developed a new preparation of gold, in connection with the rotary system. A new preparation of gold has been brought out which can be forced to the extremest portion of the cavity. This is a very desirable property in gold.

Dr. F. Y. Clark: I would like to ask the difference between the Herbst or Wolrab gold, as used now, and the gold which was manufactured by Charles Abbey in 1850, and used with a blunt instrument. Is it not very similar?

Dr. Dwinelle: I don't know that it is. Abbey made a very fine soft foil, and this Wolrab foil is nothing but a foil beaten out to an extreme thinness and rolled into a cylinder.

IODOFORM AND ARSENIOUS ACID.

I feel that in this agent (Iodoform) in combination with arsenious acid, the profession has a really *painless devitalizer under all conditions.* I have now tested it long enough, I think, to be satisfied that the conclusion reached is correctly based on collected facts. The number of cases now treated, covering all conditions of pulpitis, justify the opinion that the pulp can be devitalized while in a highly inflamed condition *without a particle of pain.* In no case has there been a variable result. In one instance the pulp resisted the action, but this, from well understood causes, is likely to be the case in a certain proportion of patients. So satisfactory has this been in my hands that I do not now hesitate to place it in any tooth, and I cannot help regarding it as one of the most valuable combinations that has ever been made for this purpose. At my suggestion, Dr. G. G. Milliken, assistant demonstrator of operative dentistry, University of Pennsylvania, has given this process careful testing, and with equally good results. It now remains for others to try, and to confirm, if possible, the conclusions I have arrived at after some months of careful investigation.

The mode of using is very simple. The usual precautions are adopted of rubber-dam, drying the cavity, etc. Then I take the amount of arsenious acid I propose to employ, it being understood, of course, that there is no change from the usual practice in this respect; place the arsenic on a glass slide kept for the purpose, and add an equal quantity of iodoform,—or an excess, it not being material; then add a five per cent. solution of carbolic acid in sufficient quantity to make a paste; and the whole is carried to the pulp on a piece of cotton the size of a pin-head. This should then be covered with a cap made from platinum, or, which is equally as good, red gutta-percha; then cover in the usual way. Instead of having an hour of pain, as is usually the case, my observations, and those of Dr. Milliken, have been that the patients have not been conscious of any action whatever. If this result is confirmed by others, then I feel confiident that we can return with some degree of comfort to the old modes of extirpation of the pulp and the filling of canals,—a practice perfected by Dr. Maynard, of Washington, and which I maintain has never yet been equalled by any mode of treatment whatever. If the time ever comes when we can keep the pulp alive and capable of performing its proper functions, I for one will rejoice; but that time, in my judgment, is not yet at hand, and it seems to me that capping, as at present understood, is simply trifling with an important organ at the expense of our patients. Whatever may be the prevalent opinion on this point, one thing must be conceded,—that the saving of an irritated pulp is next to impossible hence the value of this suggestion.—TRUMAN, *Dental Cosmos.*

ARTIFICIAL DENTURES—POINTS OF CONSTRUCTION.

1. The best and most reliable material for taking impressions of the mouth, both for partial and entire cases, is *plaster of paris.*

2. The impression should be taken with the plaster made into a paste of medium consistency, not too thin.

3. Plain teeth, with pink rubber to imitate the gums, are preferable to gum section, as better articulations can be secured, and more natural and artistic work can be made.

4. In partial lower cases where the six front teeth remain, with one or two bicuspids on either the right or left side are the most troublesome cases. The bicuspids should be extracted before the case is undertaken or it will result unsatisfactory to both the patient and operator.

5. The hard places in the mouth should be raised on the model by the use of thick tin foil as described in these papers.

6. The flask in the vulcanizer should not be covered with water, but the rubber should be hardened in steam as has been advised.

7. In making an entire upper, where the natural lower teeth remain, or an entire upper and lower set, *the six front teeth should not touch each other*. The pressure should be on the two bicuspids and first molar on each side, the last molars on both the upper and lower sets should just barely touch.

8. Looking at the artificial teeth from the front of the mouth, the *bicuspids* should be hidden behind the *cuspids*, and these teeth, as well as the molars; should incline towards the inside of the mouth; both the upper and lower incline towards the tongue. By inclining the back teeth in this way the upper set is less apt to fall while eating, and the lower teeth are held better in place, as the pressure is exerted in such a way as to keep the upper teeth in place.

9. It is preferable, in constructing entire sets for both jaws, to mount the lower set first, letting the teeth rest over the ridge and after these are mounted in wax, to mount and antagonize the upper set.

10. In making a lower plate, be sure and not have it too wide. Pull the cheeks and the lips of the patient, and observe while doing this if the plate is displaced; if displaced the plate is too wide. The patient also should be told to raise the tongue to the roof of the mouth. If on doing this the plate is lifted or moved it should be cut narrower on the inside. A mechanical dentist speaking on this subject observed: "On making a lower plate, cut it until you think you have spoiled it, then cut it a little more."

11. There is such a diversity of opinion about the "central air chamber," whether it should be used or not, that we prefer not to advise on this point. Most patients, however, prefer to have the strong adhesion which a central air chamber gives rather than the adhesion which a plain plate gives when the plate is merely lifted from the roof of the mouth.

12. In selecting teeth as to shade we have found it best always to err on a darker than a lighter color.

13. Dr. Haskell advises on inserting an upper plate to dip it in water and to place it over the gum with an up and down motion like a pumping, when if bubbles of air are seen to issue between the gum and edge of the plate the inference is that the plate fits. He says also to test the fit by using the point of an excavator at different points on the plate, and if this fails to dislodge it from the gum, it is presumed that the plate fits and will not fall in eating if the articulation of the lower teeth is correct.—CHUPEIN, *Dental Office and Laboratory*.

EATING AS IT IS DONE.

The amusing little volume, "English as She is Spoke," treats, as might be expected, of solecisms and barbarities in the use of the vernacular that becomes a much-injured step-mother in the mouths of many of her so-called children.

"Let it be remembered," says the preface, "that *anybody* can write English as she *should* be wrote, and, hence, that a certain need of admiration is due to those who, exercising their right of independent action, succeed in making it at once original and racy, and in conveying without the least effort, meanings totally opposed to their intention, affording thereby admirable examples of 'English as she is wrote' by thousands."

Anybody can, and everybody does, eat, after his or her fashion, That the fashion of doing what is so natural and so necessary to the continuance of human existence should often be so vile that man's meat becomes his bane, is a fact accepted quietly because it is so common. Sufferers and their friends talk of indigestion as of unavoidable friction of machinery. The processes of the stomach in its normal state are adjusted and regulated with an admirable regard for causes, uses and effects that reduce needful wear and tear to a minimum.

Eating and walking are both natural operations of the same human body. There are as many ways of doing one as the other, but the wrong way of feeding is attended by far more serious consequences than a slouch, or a stoop in carriage, or a hitch in locomotion. The fable of the Belly and the Members has a profound practical application which Æsop may, or may not have discerned.

It goes without saying that the primal essential to digestion is to furnish the stomach with material that may be easily assimilated by the gastric fluids. It is equally patent that this point cannot receive justice now and here. The thought of the undertaking suggests the Apostle's beautiful hyperbole: "I suppose the world itself would not contain the books that would be written." We must spur the imagination to take for granted that one out of ten Christian families in easy circumstances sits down tri-daily to meals properly prepared and served. Pass we, then to the second proviso of—

II. *Regularity in the time of eating.*

I heard a member of the above-admitted tenth family congratulating himself the other day on his ability to fast without discomfort.

According to his showing his stomach was as manageable as a stop-watch. He took his breakfast at any and all hours, dispensed with the mid-day lunch as often as not; and shifted dinner-time to suit his convenience, or that of his customers. Men of business are the chief of sinners in this respect. The noon spell—a beneficent institution bequeathed to us by our forefathers with the now almost everywhere obsolete nine o'clock curfew—shuts up the mechanic and day-laborer to the wholesome necessity of dining at a given hour the year around. Many women have "hunger-headaches," angels in disguise, that remind them of the void and faintness which are enfeebling their nerves and generally vitiating their physical forces. Such a constitutional infirmity, instead of being objurgated by the possessor, should be regarded as an alarm clock hung in the citadel, faithful to the duty of signalling the approach of danger. It is a proof of weakness, not health, when the stomach gives no token of consciousness that the season has arrived for renewed supplies. It should rest after disposing satisfactorily of each meal. At the end of a reasonable period of quiescence, it will, if all be well, awake and cry for more. In this day of common-sense and plain speech, it should be an established truth that there is nothing degrading to the higher nature in the reasonable activity of a natural animal appetite. It is not disgraceful to be hungry. Glutony is lust. The woman who proclaims that she cares nothing for eating, and has no fixed hour for family meals, is foaming out her own shame. If other interests are not jeopardized by her slip-shod desultoriness, the health and happiness of her household are.

III. Bring to the meal, served well and punctually, a body in the state most propitious to receptivity. Even in our exceptional tenth household this law is habitually disregarded. The mother hardly knows what she is eating at breakfast in her flurry of anxiety lest the children may not get off to school in season, and "Father" may lose his street-car or train. Her husband "devils" his egg with stock-market reports, and toughens his steak with political broils. The morning repast is a Gentile version of the Passover, swallowed with loins girded for the day's journey and fight; edged tones, tart words and worried faces typifying the bitter herbs. He who eats his meat in gladness and singleness of heart takes his stomach into confidence and perfect sympathy with himself.

The early dinner usually finds the eaters in a worse plight still for the reception and assimilation of nourishment. Father, mother and children are wearied, body and mind. There is no rally of the alimentary organs to welcome the new deposit committed to their ministration. The elders of the domestic group certainly have seen fagged and heated horses left in the stalls to rest until it is safe to feed them, and yet inferior animals prefer sleep to food when fatigued. But the head of the house wipes his heated brow with his handkerchief as he draws back his chair and carves furiously, while declaring that he is "tired to death." Roast beef, potatoes and pudding are a load of hot lead in the pit of his stomach all the afternoon paralyzing energy and obfusticating perceptions. By night, he "wonders if it would be possible to do without eating altogether ; a fellow feels so like a fool after a hearty dinner." Of all forms of dyspepsia the direst is that which afflicts our driving and thriving business man. His wife's lighter meal revenges itself on the preoccupied and anxious partaker in sick headache, heartburn, and the blues. Neither can make time for deliberate and restful enjoyment of the excellent food provided by one and prepared under the direction of the other.

Nature compounds interest according to a system of her own for the sum exacted of her. The right kind of nourishment taken in moderation when body and spirits are in just and pleasant tune, is refreshment and not oppression. The partaker leaves the table stronger and blither than when he sat down.

IV. *Mastication* is almost a lost art with our average busy man and woman. What the knife and fork do not accomplish in severing flesh and fibre is deputed to the gastric juices. Chyle, when put on its mettle, is potent and patient, but, not having been appointed to the office of mill-stone or meat-chopper, must, perforce, sometimes disappoint great expectations. Children should be taught to *chew* at whatever expense to the mother's time and temper. Alfred Ayres, the celebrated orthoepist, says in "The Mentor"—"The chief reason that Americans have bad teeth, is that we do not use our teeth sufficiently. We live almost exclusively on food that requires very little mastication ; and as for the front teeth, we scarcely use them at all."

He might have added that we make ourselves too busy to masticate solids when they are given to us. Joe Gargary's horror of "bolting" did credit to his sound sense, and was hardly to be looked for in a country blacksmith. The toss and gulp that pass with our industrious householder for eating, are disgusting to behold, and as pernicious in consequences as infectious in example. If he were a ruminating animal, with a quartette of stomachs, his boast, thinly veiled under a sham of confession—"I eat at railroad speed"—would be less humiliating to him and the race.

These are homely hints, but they bear directly upon an aggregate of needless suffering that moves us to pity and indignation. The golden mean between gourmandism and such careless appropriation of creature comforts as we style (unflatteringly to the beasts that perish) "the gratification of brute appetite," lies in obedience to the few and simple rules offered in this paper. When we learn what and when and how to eat, we shall set sail on the high seas toward the perceptibility of human (physical) nature.—MARION HARLAND, *Journal of Reconstructives.*

THE SALIVA AND THE GASTRIC JUICE.

The importance of mastication in the economy of chylopoëtics has always been admitted, but the value of the saliva except as a solvent and lubricator, has been much doubted. Most of the early physiologists, including Schwann, Beaumont and Claude Bernard, thought that saliva had no more value in digestion than pure water. In later years, however, the experiments and observations of Frerichs, Brücke, and especially Von den Velden have shown that saliva has a practically useful role as a starch digester. Clinical observers have noticed severe digestive and nutritional disturbance resulting from loss or deficient secretion of saliva. Frerichs found the symptoms to be anorexia, and a constant sense of pressure in the epigastrium. Wright collected in a week a quart of saliva from his own glands, and during that time lost twelve pounds in weight. The same observer found that food injected into the stomach of dogs digested imperfectly when saliva was kept from the stomach by ligating the œsophagus.

The generally accepted view is now that which was first solidly established by Von den Velden: viz., that the saliva after being taken into the stomach with the food acts for a time upon starchy matters, turning them into glucon. After ten or twenty minutes, the acidity of the gastric juice has so increased as to stop the amylolytic action, and only proteid digestion begins. Dr. George Sticker, who, in conjunction with Dr. Curt Hübner, has made some experimental studies on the physiology of secretions has recently published an article in which still more is claimed for the saliva than a purely amylolytic power. He believes that this secretion taken into the stomach assists in the formation and secretion of pepsin, and thus indirectly assists in proteid digestion. A suspension of salivary secretion suspends largely that of peptic secretion also. He cites the case of a woman who suffered from an almost complete suspension of the salivary function. There was indigestion of meats as well as of carbohydrates. The re-establishment of the salivary flow by means of infusion of jaborandi, relieved the stomacn trouble also.

Sticker performed several curious experiments to test the capacity of the stomach to digest food without the help of saliva. In one case, after twelve hours' fast, the person experimented upon had his stomach carefully washed out, and was then given the whites of four eggs. The saliva was then expectorated or carefully absorbed by a sponge placed in the mouth. After two hours the stomach contents were carefully removed, and the egg-albumen was found to be only slightly digested. The gastric juice was tested, and found to be weak in proteolytic power and in acid. In the central experiment the albumen was found digested; and the gastric juice fully up to the normal in acidity (.25 per cent. HCl), and peptic power. Four experiments of the kind indicated were performed, and all leading to the same result. The view of Sticker includes more than the commonly accepted opinion that the alkaline saliva stimulates the flow of gastric juice. He believes that saliva actually assists in the complex process by which the active constituents of the gastric juice are formed. His work, at any rate, will emphasize the practical importance of the thorough mastication and insalivation of food. The victims of the gum-chewing habit will find some physiological justification in Sticker's "Wechselbeziehungen Zwischen Speichel und Magensaft."—*Medical Record.*

A "MEDICAL TRAMP'S" OPINION OF SIR LAWSON TAIT AND HIS WORK.

From statements made in some of the medical journals we had concluded that many of the eminent surgeons of the old world were opposed to the antiseptic dressing in the treatment of wounds, but such is not the fact. All the eminent surgeons in the country we have visited, practice Listerism, and are very careful to carry out the strictest precautious. We know, as stated, that a few physicians and surgeons are opposed to the use of antiseptics in surgical practice, among them is Sir Lawson Tait, but then his statements are not regarded as reliable anywhere, many good men even doubting the statements in regard to the number of cases reported. We were very much surprised to learn the standing of this man who is so frequently referred to in our own country, and we regret to say that even in Edinburgh, where he was educated and known, we are informed that his statements could not be relied upon. One evidence of his attempting to deceive is that he will not admit physicians to his operations, and we heard him say at the meeting of the British Medical Association that he had been misrepresented by some "*medical tramp*," and that he did not admit them to his operations; but it is thought that the reason for his not admitting physicians is that he does not care to have the profession know just what he is doing. At the last meeting of the British medical association he had a young man, one of his students, read the report of his cases for the year past which showed the number of operations made, with the result of each, and the closing statement of the young man was the most amusing of all when he stated that these cases were all dressed without any antiseptic except the dry dressing, which was the only true antiseptic dressing for surgical cases. Just imagine a young man, scarcely out of his teens, standing before such a body of men as were present in the obstetrical section of the great British medical association, and making such a statement, arrogant in the extreme; but it was treated with silent contempt by the members present, for the reason that they had some sympathy for the boy, knowing that he had been employed by Sir Tate to do what he was ashamed to do himself, and consequently no one would say a word to the poor young man who had to do his master's bidding. The men who oppose the antiseptic dressing will certainly come to grief, for it is impossible for them to maintain the position they have taken.

We have had the opportunity of seeing Dr. Keith make several operations; he is very skillful, and is quite careful to carry out the antiseptic precautions in his practice. He is a perfect gentleman and takes great pains with visiting physicians, the "medical tramp" referred to by Sir Lawson Tait. Dr. Keith is quite a different man—a gentleman in every sense of the term.

In the Royal Infirmary of Edinburg, the surgeons use as an antiseptic dressing a saturated solution of boracic acid, and claim that it is as good, if not better, than carbolic acid. The saturated solution is made by adding all the acid to hot water that it will dissolve or hold in solution. The powdered boracic acid is used in the place of iodoform. Good results follow its use.—Editorial, *Fort Wayne Journal of the Medical Sciences.*

THE TRANSPLANTATION OF TEETH.

BY EILIMS, SAN FRA'CIS.

In view of the pending experimental tests to prove the feasibility of transplanting teeth from dead golgothian jaws, into the living, to eke out a new term of service, the following therapeutical additions will increase the probabilities of success in the ultimate project of Dr. W. J. Younger, and increase the strength of his pericemental grip.

Having an opportunity to favor the curiosity of a young lady—Miss Eve Evangelyne Pinkton—who desired to have a defective upper front tooth replaced by a natural one implanted in its socket; with due expostulation against the presumptuous, and in her case, unnecessary risque, I at last consented to perform the ingraft operation when I found that it would be impossible to controvert with reason her determination to be in fashion. Aware that in order to insure success in any important surgical operation, it is necessary to have every instrument and all the appliances likely to be required ready at hand, I did not neglect anything that thoughtful foresight prompted, and had all within reach of my assistants. For the gratification of her desire to have a painless delivery from the defective tooth, native to the manor born, she insisted upon taking the most fashionable anæsthetic, such as first-class ladies were in the habit of using. After objecting to several, from frivolous pretexts, she finally expressed her preference for the etherial extract of leeks, if it could be administered so that she would not "schmell" the horrid odor, "for," she objected, "if there is anything I do hate it is the stink of an onion, young or old!" As her dread was quieted with the assurance that it was highly fashionable, and chief as an anæsthetic, she inhaled it without further hesitation; but her kicks and frequent asseverations delayed the operation of extracting so long, it was found necessary to defer the setting, after extracting the tooth, until the following day.

In the meantime, in order to keep the socket-cavity free from the collection of foreign matter, a suitable section of willow wand, with the bark on, was gently introduced into the socket and left over night. On attempting to remove the willow pivot, to resume the operation in the morning, I found it had become so expanded with moisture as to tightly fill the socket irregularities. Then, too late, I sadly regretted my lack of foresight in not covering the pivot with a film of cotton, to allow for expansion and easy withdrawal. The motto proverb, "*Nil desperandum,*" seemed, in prospect of the difficulty of removing the willow pivot, to offer but slight consolation for the relief of my dilemma. But under the nervous impetuous of momentary vexation, I seized, with a pair of pliers, the projecting portion of the pivot; expecting strong resistance, I used sudden force, when, presto! out the pivot slipped and was retained between the blades of the pliers. On examination I found it had slipped from the bark envelope, which was retained in the socket as a lining membrane. On a careful inspection, with a suitable instrument, I discovered its close attachment, seemingly an integral part of the socket—in appearance, from all indications, acting the part of an adopted membrane. Finding that any attempt to remove the whole would prove abortive, I concluded to let it remain and retain its vicarious hold intact, thinking that the therapeutic effect of the bark's decomposition might serve to allay rather than excite irritation. The introduction of the tooth into the socket, proved a tight and perfect fit in all respects, so I determined to let it remain without any artificial security, other than the socket with its willow-bark periosteum.

Reported progress of Miss E. E. Pinkton's case, on the second day after tooth transplantation: The trial inspection proved that there was little soreness to the touch, with an entire freedom from pain of any kind. The appearance, in correspondence with other teeth, was so perfect as to defy detection, and with exception of mottled variation of color in and about the margin of the salicylate points of assimilative union of the gum, the alveolar contour is natural in expression.

Sixth Day: The favorable union of the assimilative process is so far advanced that the effect of Dr. Younger's socket boring presents none of the jagged marginal irregulatities common to the extraction of teeth; the salicylate gum substance having attached itself perfectly to the neck of the tooth with a firm "pericemental grip" that would have caused the boring projector's crista galli to rise with the chanticleering song of triumph, M. R. C. S.

Seventh Day: Fully engrossed with the favorable auguries of the vegeto-flesh assimilation in the transplantation of Miss Pinkton's tooth, I found her waiting at an early hour to have her gum inspected. Its appearance was eminently satisfactory in every respect. On asking her if she had experienced any peculiar sensation in her jaw, approaching pain, she said, "she had felt a snapping sensation and a ticking sound, as if a lot of old lady fairies were holding a sociable knitting-circle in her jaw (knitting of the bone)," but she had had no actual pain, unless an occasional nervous twitch, as if one of the old lady fairies was taking up a stitch, might be called pain. Actual open demonstration of the hitherto-hidden operations of combined external and internal assimilation, in the reparative process of nature, could hardly have depicted more clearly the real fact.

MEMORANDA.—The process of absorption and assimilation physiologically and pathologically considered, is apparently self-vitalizing support when the substance is derived from digestive sources. But in the case of Miss Pinkton, it bears the type singularity of adoptive assimilation, as in the Talicolian operation of supply of substance from ingraft, and is especially adapted for the prevention of destructive absorption of septic matter in dento-inoculation experiments like those published by Dr. Younger.

Twelfth Day: The willow periosteum has become fully translated into periosseous gum, and with every evidence of corresponding deposit of ossific matter in the cellular and cancellated structure of the jaw in diffused extension.

DEDUCTIVE RESULT.—It is prospectively certain that from the combination of the anæsthetic extract of deodorized leeks, and salicylic gum periosteum for the preservation of alveolic contour and increase of the "pericemental grip," we may expect great things for the stay of gullibility and promotion of the Wamba candidates for M. R. C. S.

TRAVESTIES OF JUSTICE (MEDICAL).

There have been within the past year many cases of importance in our criminal courts, where, it is charged, justice has been delayed, and the criminal escaped, from collusion with medical men. We do not wish to call names, but in late prosecutions in our courts there have been too many "medical certificates." A man is seen in bar rooms, "hail fellow well met," one day, and the next is pronounced by a medical certificate from a political friend (fee, five dollars), "too ill from the consequences of a slight disturbance, which occurred two years since, and which has reappeared," at just the time most neeeded for the safety of his friends (political) to be able to attend court. We have said before, and we repeat it, that our profession is daily made a cats-paw for criminals, and that a good fee will influence some of our members; and given a good chance, there is scarcely one of the moral or political laws that has not its price for its infraction. This would be a *horrible* charge to make against *educated men*, but unfortunately, as a class, *we are not educated, medically or morally*. Political and social (?) influence is paramount. Learning, and a high sense of honor, are found but among the few; the oath of Hippocrates is counted a farce, and a relic of the dark ages.

We had, not long since, a case where a prominent physician (?) received a large fee for a crime, and then sold his patient's secret for a larger one. And we call ourselves an "honorable body!" We prosecute a poor devil who declares openly that he will commit a crime for ten dollars, and admire one of our "close communion" brothers, who sells his honor to shield a criminal, for less. No doubt but every city in the world furnishes many such examples, but that only makes more forcible the assertion, that the practice of medicine is no longer founded upon that nice sense of honor, which would impel its votary to meet death, rather than to sully his soul with a suspicion of malfeasance to the code of his profession.

History repeats itself, and we confidently predict the coming of the time in our state, as it has in every other, when the great body of medical men will revolve around the nucleus of a few politico-medical charlatans, ready to sell themselves body and soul for the chance of an admission into the area of the political combination, which controls the dispensing of medical offices.—*Pacific Record of Medicine and Surgery.*

BRIDGE-WORK FLUX.

A fluid that is exceedingly useful in bridge-work is prepared as follows: Put in a cup boracic acid, 1 oz.; ammonia, ½ oz.; carbonate of ammonia, ½ dwt.; bi-carbonate of soda, 2 dwt.; and water, 4 ozs. Boil until the fumes of ammonia are no longer given off. Coat the bridge or other work all over the gold with the flux. Heat it over a spirit-lamp to dry it on. Give it another coat, if needed, leaving no part exposed. Then scrape off where it is desired that the solder shall flow, and it will go nowhere else. The work will come out of the heating as bright as when it went in, and the solder will be smooth. The polished surfaces will not be corroded or blackened.—Howe, *Independent Practitioner.*

EVERY DAY ERRORS.

"I regard the use of beer as the true temperance principle. When I work all day and am exhausted, nothing helps me like a glass of beer. It assists nature, you understand," said Remson to Benson. "It makes a fool of me," Benson replied. "Just so," exclaimed Remson, "that's what I say; it assists nature.

The termination (*heimer*, *Heim*, *home*), is in Germany given to many wines, as *Laubenheimer*, *Rüdesheimer*, etc. Pump water is sometimes jocosely called at table *Pumpenheimer*.

A Texas medical journal, praising the virtue of a new make of infant's feeding bottle, winds up by saying: "When the baby is done drinking it must be unscrewed and laid in a cool place under a tap. If the baby does not thrive on fresh milk, it should be boiled."

"What a horrible odor of carburretted hydrogen!" exclaimed a Girton college student. "Mum?" said the janitor, with a puzzled countenance. "The smell of carburretted hydrogen," she explained. "That's no kind of gin, mum," replied the janitor; "that's garse. The pipe is leaky, mum."

NYE ON PIE.

Is it not singular that the gray-eyed and gentle Columbus should have added a hemisphere to the history of our globe, a hemisphere, too, where pie is a common thing not only on Sunday, but throughout the week, and yet that he should have gone down to his grave pieless?

Such is the history of progress in all ages and in all lines of thought and investigation. Such is the meager reward of the pioneer in a new field of action. I presume America to-day has a larger pie area than any other land in which the cockney English is spoken. Right here, where millions of native-born Americans dwell, many of whom are ashamed of the fact that they were born here, and which shame is entirely mutual between the Goddess of Liberty and themselves, we have a style of pie that no other land can boast of.

From the bleak and acid dried apple pie of Maine to the irrigated mince pie of the blue Pacific, and all along down the long line of igneous, volcanic and stratified pie, America, the land of the freedom bird with the high instep to his nose, leads the world.

Other lands may point with undissembled pride to their polygamy and their cholera, but we reck not. Our polygamy here is still in its infancy and our leprosy has had the disadvantage of a cold, backward spring; but look at our pie!

Throuhgout a long and disastrous war, sometimes referred to as a fratricidal war, during which this fair land was drenched in blood, and also during which aforesaid war numerous frightful blunders were made which are fast coming to the surface—through the courtesy of participants in said war, who have patiently waited for those who blundered to die off, and now admit that those participants who are dead did blunder exceedingly throughout all this long and deadly struggle for the supremacy of liberty and right—as I was about to say when my mind began to wobble, the American pie has shown forth resplendent in the full glare of a noonday sun or beneath the pale green of the electric light, and she stands forth proudly to-day with her undying loyalty to dyspepsia untrammeled, and her deep and deadly gastric antipaty still fiercely burning in her breast.

A NEW PLASTER BIN.

One of the most convenient receptacles for holding plaster for use in the laboratory may be had by using "Clark's Wonderful Flour Bin." This bin is made of tin, in the shape of an ordinary oil can inverted, the bottom of the can being the top of the bin, with a removable cover. It is intended to be suspended on the wall, directly over the table. At the bottom or small end is attached an ordinary flour sifter, with cap to cover it when not in use.

The flour is put in at the top and passes through the seive when the handle is rotated. For plaster it should be modified by attaching a short funnel to the lower edge of the sifter. The opening in the small end of the funnel should be about an inch and a half in diameter. To this opening a cover is attached by a hinge with a hasp to hold it when shut. The bin is suspended over the plaster table, the plaster put in at the top, and when wanted place the bowl in which the plaster is to be mixed containing the necessary amount of water directly beneath the lower end of the bin, drop the cover and rotate the handle slowly, and the plaster will be evenly sifted into the water, the only correct way of mixing plaster. Try it, and you will be pleased.—E., *Archives of Dentistry.*

CHLOROFORM AN EXCELLENT HÆMOSTATIC.

Dr. Ipaak, of Brussels, has found a mixture of 2 parts chloroform and 100 parts of water to be an excellent hæmostatic in bleeding of the gums after the extraction of teeth. Probably it would be serviceable in other cases where only small vessels are ruptured. Chloroform requires about 300 parts of water for solution; hence the above-named proportions of water and chloroform will not form a clear solution, but rather a mixture, which will have to be shaken up when it is required to be used.—*American Druggist.*

THE FUNCTIONS OF THE TONSILS.

Adenoid tissue everywhere is more largely developed in childhood, when not only nutrition but growth has to be provided for, than it is afterwards. And there is nothing surprising in the fact that these nurseries of young leucocytes (permit the fancy), planted here as it were by the riverside, and drawing their sustenance from the neutrient stream [saliva], should dwindle in later life when the demand for white cells has become much less.—Fox, *Journal of Anatomy and Physiology.*

ADVANTAGES OF THE HERBST METHOD.

1st. Better adaptation for the walls of a cavity than any other system renders possible.

2d. The saving of time.

3d. Increased facility in some of the most difficult operations (as proximate surfaces of the molars and bicuspids).

4th. Gold can be perfectly adapted to the thin walls of enamel without danger of fracture.

5th. The introduction of gold, when done by this method, is much less annoying to the patient, and less laborious to the operator.

ROOT CANAL DRESSING.

Eighty parts iodoform, fifteen parts oil of cinnamon, and five parts finely powdered ground coffee, packed into a foul root, will disinfect it, and also prove a very agreeable dressing.—*Dental Review.*

A SUGGESTIVE THEORY.

Professor Bolton expresses the opinion that the crowning glory of modern chemistry is the power of producing in the laboratory, from inorganic matter, substances identical with those existing in the vegetable and animal kingdoms—it being known now that the same chemical laws rule animate and inanimate nature, and that any definite compound produced in the former can be prepared by synthesis as soon as its chemical constitution has been made out.—*Exchange.*

CONDUCTOR'S DEPARTMENT.

THE DISTRICT SOCIETIES AT BUFFALO.

The nineteenth annual meeting of the Seventh and Eighth societies, and by invitation the Sixth, was held as above, last October. The attendance was large, the number of excellent papers likewise, the interest unflagging, and the enjoyment a complete overflow. For two days Dr. J. Granger, president of the Eighth, and his faithful lieutenant, Dr. C. S. Butler, chairman of the business committee, kept everyone on the jump, and while there was no undue haste neither was there a moment's time lost—simply a steady push from opening to close. The management of the meeting reflected great credit on all concerned, but particularly the chairman of the business committee.

At the close of the meeting, members and guests repaired to the "Genesee," where all sat down to a "layout" that was described as "simply elegant." Dr. W. C. Barrett acted as toastmaster, and with rare exceptions managed to call out all, and more, than the several speakers thought they had in them. Poppenberg's orchestra made eating and speaking, particularly the former, very easy for all who were wise enough to wait till morning to go home.

CORRECTIONS.

The following corrections were overlooked in the preparation of the October number: On Page 118 of the July number, sixth paragraph, transpose the words "denser" and "rarer." On Page 135, make seventh line read, "The result l (not 'm' as printed) will be in the same unit as l."

AT HOME AGAIN.

Everyone of his acquaintance will rejoice to hear that Dr. E. D. Downs, of Owego, President of the Sixth District Dental Society, is again at home, with good prospects of a speedy recovery from the operation performed last October at the New York Hospital. The doctor has lost his right leg, but without a recurrence of his trouble he will soon get the better of the new one.

FIRST DISTRICT—NINETEENTH ANNIVERSARY.

According to promise I send you an outline of the doings at the the biggest dental meeting held anywhere since Section Eighteen's success at Washington, hoping it may reach you in time to take advantage of the partially promised delay in your January issue.

Perhaps three hundred members and friends (estimated at some of the sessions at six hundred to seven hundred) of the Society gathered in the grand lodge room of Masonic Temple, last Monday evening (the 16th) to listen to the addresses and papers previously announced in the widely-distributed programmes. The assemblage included visitors from all the principal cities east of the Mississippi, the New England and middle states predominating, of course. Chicago, as usual, sent a big delegation, and of her best known men, too.

Dr. W. W. Walker, the president, called the meeting to order, and introduced the Society's standby, Rev. Dr. Brady E. Backus, who invoked the divine blessing on those present, and whatever in their wisdom they might see fit to do.

The president then addressed the society and its guests, outlining the feast in prospect, lauding to the skies dentistry, the medical congress, the first district society, its past executive officers—Dr. A. L. Northrup in particular—and the younger, pushing element now beginning to make itself felt. He was frequently applauded, and deservedly, too, because first, like the hero of the hatchet, he told the truth, and second, he told it eloquently and well. Congratulations were in order later in the evening, and they came thick and fast.

The response was by Dr. Louis Jack, of Philadelphia. Instead of an address it took the form of an essay, nearly the whole of which was lost on fully two-thirds of the audience, because of the speaker's weak voice and the wretched acoustics of the hall.

J. Kimberly Beech, Esq., did not think the subject set opposite his name, "Past and Future Litigation affecting Dentistry," expressed just what he would talk to, but something about litigation of a very recent period might answer quite as well, and more nearly meet the present requirements of the interests of some of his hearers. Litigation, he said, was simply a method of settling disputes. It did not necessarily have anything to do with the justice or injustice of the things involved. Evidence was introduced and passed upon and a decision obtained. In other words, a settlement, for the time being at least, had been effected. He then discussed the crown and bridge patents, where they now stood, what might be the outcome of legal work then in progress. He described in detail the several crowns and bridges, and the difference between the no-good "Richmond" bridge and the good one known as the "Low." He could not bring himself to believe that a thing that to all intents and purposes became a part of a human being, the outcome of that being's anatomical and physiological necessities, and that involved more or less of physical suffering, was a proper thing to issue a patent upon. He would as soon think of issuing a patent on a method of amputating a leg. In closing, he assured those present that lawyers had more than a fee-interest in their cases—that they were as anxious to succeed as their clients were to have them, and he hoped they would be enabled, by the aid of the dental profession, to carry on the struggle in which they had already accomplisned so much. Mr. Beech made an excellent impression, and took his seat amid a storm of applause.

Dr. W. H. Dwinelle followed, calling attention to some of his contributions to crown work published in the *American Journal of Dental Science*, in 1856, and referred to recently in the *Dental Cosmos* by Dr. W. Storer How.

Dr. C. F. W. Bodecker read a "Report of the Microscopical Examination of an Implanted Tooth Extracted from the Mouth of Dr. W. J. Younger." Two sets of sections had been made, and every section carefully studied. The conclusion was that nothing approaching the normal union of teeth to the jaw could be found, and that teeth implanted in artificial sockets are held in place mechanically rather than otherwise.

Dr. Carl Heitzman next took the rostrum, corroborating what Dr. Bodecker had said, and sketching on a blackboard, as he talked, what both had seen. As in the case of Dr. Jack, Dr. Heitzman's remarks were lost except to those in the front seats.

Dr. G. L. Curtis followed with a statement of cases, also a description of sections of an implanted, the microscopical examination of which had been made by Dr. W.M. Grey, of Washington. He showed a model of an upper jaw containing on one side a canine and a bicuspid, on the other a molar, and an implanted bicuspid in the place formerly occupied by the canine of that side, and stated that he had used these four teeth as a support for a bridge of ten or a dozen teeth. The question arose in the minds of the anti-union element, how much of the support was contributed by the implanted tooth—if it would not have contributed as much if simply placed against the jaw—the other three doing the actual work in retaining the structure in place.

Dr. G. V. Black followed with a few remarks, critical and conclusive, so far as he had been able to study Dr. Curtis' specimens in the brief time at his command.

Dr. W. H. Atkinson took the floor and held it long enough to compliment the several speakers, and particularly "that man sitting there" (pointing to Dr. Heitzman), at whose shrine he has long been one of the most faithful of worshippers.

Dr. G. V. Black presented "An Examination of the Distinctive Forces in Physics, with Relation to the Germ Theory;" Dr. Frank Abbott, "A Contribution to the Knowledge of Tumors of the Jaws;" Dr. J. N. Farrar, "Philosophy of Correcting Irregularities of the Teeth;" Dr. W. H. Atkinson, "Studies in Pyhorrhea Alveolaris, with Illustrations from a Six-week's Kitten;" and Dr. J. Foster Flagg, an untimely paper on the just-now-dead topic of dentistry not a specialty of medicine. We say "untimely," for while it may have been the right thing (and we do not say it was not), it was certainly read at the wrong time.

In the discussions following these papers the essayists, and as near as we could get the names as they were announced, Drs. Sudduth, Stockwell, Heitzman, Andrews, Brophy, Guilford, Kingsley, Pierce, Darby, Turner, Adair, Rhein, Starr, and Truman freely participated, Dr. Rhein reading a short paper descriptive of the treatment of a case of pyorrhea alveolaris, accompanying it by models of the case at various stages, and finally presenting the patient himself—a clear case of "the proof of the pudding," etc. The teeth had been drawn together by degrees, and to retain them in place a wire sunk into the cutting edge of each tooth, thus tying the whole series as fused crowns.

The clinics at the New York college, Tuesday and Wednesday mornings, were so well attended that very few saw what was being done. Some of the completed operations were very fine, showing that there are still some saints in dentistry who can do a good thing for their patients without losing temper, with two dozen men piled on top of them, and two to five students blocking the window in their anxiety to see the last chip fly.

The third day afternoon the Society's guests were tendered an informal reception and dinner, seventy-five to one hundred sitting down to the feast. At its conclusion there was the usual "flow of soul." Nobody hurt!

In conclusion, the First district's nineteenth anniversary may be put down as a success.

MEMORANDA.

Many of those present at the meeting ran over to Newark the next evening (Thursday) to attend a regular meeting of the Central Dental Association of New Jersey.

Among the announcements made by the president was the receipt of a telegram from Dr. L. D. Sheppard saying the illness of his son, then not expected to live, would prevent him from being at the meeting. A telegram expressing the meeting's sympathy, was sent immediately.

Dr. Moire, of Charleston, was detained at home by an attack of fever—typhoid, as we understood it.

Dr. W. C. Barrett was also confined to his home by illness, and therefore unable to be present.

Dr. E. D. Downs received a number of old friends at the New York Hospital. He will attend the next anniversary with the rest of us.

In using steel jack screws the corrosive effect of the oral secretions may be prevented, and the screws nicely lubricated, by immersing them in hot paraffine. This should be done every three or four days.

TOOTH-CROWN COMPANY'S SUITS.

November 1st, 1887.

A. L. NORTHROP, D. D. S.,

Dear Sir :—In answer to your request on behalf of First District Dental Society of New York, asking for our opinion as to the legal position of the dental profession, with regard to the crown and bridge patents of the "International Tooth Crown Company," in view of the recent decision of Judges Wallace and Shipman, in the Richmond and Gaylord suits, and advice as to relief from further claims made under the Low bridge patent, we have to say.

These suits involved the validity of the two patents to Cassius M. Richmond, Nos. 277,941 and 277,943, for "Tooth Crowns, etc," the patent to Alvan S. Richmond, No. 277,933, for "bridge," all dated May 22d, 1883, and the patent to James E. Low, for "method of supporting artificial teeth by bands cemented to permanent teeth," Nos. 238,040, dated March 15th, 1881.

The first two patents covered what is known as the "Richmond" and the "Sheffield" tooth crown in all its varieties. They were held invalid, and therefore you are at liberty to make such tooth crowns without being in any way liable to the International Tooth Crown Company.

The complainants have appealed this case to the United States Supreme Court, but we do not advise you that any different decision will probably result. The practical result is that the tooth crown is free.

The patent for the Richmond bridge was also held invalid, but the Low patent was declared to be good. This Low patent covers a bridge attached to continuous bands cemented to adjoining permanent teeth, "whereby said artificial teeth are supported by said permanent teeth without dependence on the gum beneath."

The Richmond patent is, as you will remember, for a bridge supported by caps, and the Court held that it was not invention for Richmond to support a bridge on caps, but it was invention for Low to support a bridge on bands, taking all the surrounding circumstances into consideration, and that as a cap was nothing but a band with roof on it, the Richmond bridge infringed the Low patent.

The practical effect of this decision, if the complaint chooses to follow it up diligently, and unless some new evidence is found, will be to shut the profession out from inserting permanent bridges supported at one or more points by cemented caps or bands without dependence on the gum.

As the matter now stands, any dentist inserting a Richmond bridge (according to the decision), infringes the Low patent ; and an injunction would doubtless now be granted by any Federal Judge on application, on the strength of that adjudication alone.

An appeal can be taken by the defendants to the Supreme Court, a year or so hence, after an accounting by them, and determining the amount of profits or damages the complainant is entitled to recover.

The way of relief is for all dentists of the United States, who supported artificial teeth on a band or bar, surrounding and extending between permanent teeth, prior to September, 1878, to send to us at No. 833 Broadway, New York City, or to No. 9 Law Chambers, New Haven, Connecticut, a truthful description of what he did, and for whom, and where and when.

If such proof can be made strong and clear enough to satisfy the Court that what Low described was well known, and had been long practiced by dentists in the United States before Low claims to have done it, the present case might be opened for re-hearing on the newly-discovered evidence—or the Courts might refuse to grant injunctions, upon the ground that the present decision would have been the other way if this evidence had been before it—at any rate, the question of the validity of the Low patent would be re-tried, if its owner ever had the temerity to sue a dentist whose mouth had not been closed by a license, in which he covenanted never to deny its validity.

Whether, in a suit against such a license the Court would enjoin upon the *covenants*, under a patent declared void, either before or after the taking of the license, we can not say.

Your Obedient Servants,
SOLOMON J. GORDON, 833 Broadway, New York City,
JOHN K. BEECH, 9 Law Chambers, New Haven, Conn.

An occasional contributor writes as follows : " For over two years I have been a wandering invalid, with my correspondence in search of me. A copy of your journal found me several weeks since, and surprised me with its great improvement in every respect. It certainly is a model of journalistic art in its specialty, and I heartily congratulate you in the successful display of ability and taste in design and execution."

COCAINE AND CARBOLIC ACID ANÆTHESIA.

M. Vian (*London Medical Record*) found that Witzel's method of injecting 1½ grains of cocaine in dental operations gave very good results, but two out of eight patients experienced constitutional disturbances of an alarming character, and several othere were markedly inconvenienced. He therefore dissolved three-fourths of a grain of cocaine in eight minims of a two per cent. solution of carbolic acid, which he used as follows: Eight minims of the above mixture are slowly injected, half on the labial and half on the lingual or palatal aspect of the gum at a spot situated half-way between the neck of the tooth and the presumed end of the root. A finger should be kept over the site of the puncture to prevent the escape of the fluid, and the surrounding parts should be protected by pledgets of cotton-wool. The patient rinses out his mouth with water, and five minutes are allowed to elapse before beginning the operation. M. Vian has operated on eighty-six patients, with a very successful result in all; no disturbance, except of an emotional kind, ever following. Very good results were obtained by the use of the carbolized solution alone, and he is disposed to consider carbolic acid as efficient a local anæsthetic as cocaine for dental purposes.

PELLETS.

For the second time in two years we see the *British Journal of Dental Science.*

Drs. E. A. Bogue and I. B. Davenport have removed from 39 to 73 Boulevard Haussmann, Paris.

The Century should have a place on every office table. Its matter and illustrations take the hurry all out of the waiting patient.

Dr. B. F. Mason, of Phœnix, N. Y., has combined floss silk with the ordinary quill pick in a very ingenious way. It ought to "take."

A man must be clothed with society, or we shall feel a certain barrenness and poverty, as of a displaced and unfurnished member. He is to be dressed in arts and institutions, as well as in body garments. Now and then a man exquisitely made can live alone, and must; but coop up most men and you undo them.—*Emerson.*

Let graduates of American dental colleges take heed—the D. D. S. must go. It's English that it should; likewise it is rapidly becoming German, too.

Carlyle's * * * imagination, finding no nutriment in any creation, avenged itself by celebrating the majestic beauty of the laws of decay.—*Emerson.*

Dr. W. Geo. Beers' "Two dentists who do not 'get on,'" will have to have his article shot into them, or miss his good advice, as neither of them takes a journal.

Pierson is at it again sending his friends a copy each of his appointment book bearing in gold letters the recipient's full name. Thanks, old boy, thanks!

Only four per cent. of American medical students have literary or scientific degrees, and but two and a half per cent. of the licensed practitioners are college graduates.

The *National Druggist* says: A young lady in giving her experience in a dentist's chair, said it was hardly as agreeable as a box at the opera, but better than being run over by the cars.

The *American Homeopathist*, edited by Dr. B. F. Underwood, and published at Brooklyn, is one of the best exponents of the teachings of that school. It contains the news right up to date.

Lippincott's is as interesting as ever—stories complete in each issue (as a rule) and short papers on current matters. "Social Life at Johns Hopkins," a prize effort, calls for special commendation.

Many are availing themselves of the offer of the *Independent Practitioner* to supply both that excellent periodical and a copy of Stowell's "Microscopic Studies of a Human Tooth," at a merely nominal figure.

We find the following in the *Buffalo Medical and Surgical Journal:* "There once existed 'The Central Medical College of Rochester.' The faculty in this remarkable institution were the students—the students, the faculty. At the close of a short and comprehensive course of study, the faculty conferred degrees upon themselves, and some are practitioners in our midst to-day."

Dr. Thos. G. Lee, whose regular installment of "Animal Histology" will appear fully illustrated in our April number, has returned from Europe, married him a wife, and is now well on with his winter's work at Yale University.

The VanNostrands of New York, publishers of scientific works of high grade, have urged Mr. Geo. W. Rafter to work his papers, several of which first appeared in this journal, into book form for publication by their firm.

The Whitmore hammerless, double-barrelled shot gun, invented and patented by A. E. Whitmore, of Springfield, Mass., is the coming gun. We mention it because some of our readers are a little "gone" on that sort of thing, and like to be kept informed.

Dentists who have law business of any kind to transact with each other, or their patients, cannot afford to let go unread Mr. Daniel Nason's "Legal Status of Dentists," which appeared in the October issue of this journal, and has since been gotten out in pamphlet form.

Strength, compactness, convenience, and durability are the essential qualities which a good visiting list should possess. Lindsay & Blakiston's Visiting List has them all. Its contents are arranged in the most advantageous way, including tables and specific information.

"Professor Truman, of the Philadelphia university," writes "F" in the current *Independent Practitioner*. "F.," take our advice, pull your hat over your ears and hold your scalp on tight. The Professor taught us once, but no man ever dared to speak of him as of the "Philadelphia" university.

As usual the Chicago Dental Society dined at the Richilieu, and as usual we did not get there except by brief telegram. They had a great time just the same, not only at the dinner, but also the meetings and clinics. When Chicago does anything she does it for "keeps." May she see many returns of the day.

Guilford's "Nitrous Oxide," published by the White Company, should be in the hands of every one who finds it necessary to use this anæsthetic (?) in extracting teeth and other small operations. It is a practical statement of all that one needs to know of the subject, and by a very practical man.

'Teeth, and How to Save Them for Life," is the title of a lecture delivered before the graduating class and high school at Aberdeen, Dakota, by Dr. P. F. Swengle. Efforts similar to this, and before such bodies, by competent men, are much needed by both dentistry and the public. We congratulate the author.

The *Journal of the Royal Microscopical Society* reproduces the greater part of M . Geo. W. Rafter's article "On the Use of the Amplifier," which appeared some time since in this journal, making its own cuts, and giving due credit. We hope soon to be able to place it under further obligation.

We all had our picture "took" at the Buffalo union meeting. Dr. S. A. Freeman has their distribution in charge—$1.00 Bliss Brothers succeeded in catching every one present in the very act. It is proper to add that all the handsome men in the group, with a possible exception or two, are members of the Seventh Society.

The postmaster at Milwaukee begs to inform the publisher that his "paper," addressed to Blank, remains dead in his (the postmaster's) office, and gives as the reason, "Refused. Says he does not want it, and that he has forgotten more than you all know." LATER—Wing-buds are beginning to show themselves at this fellow's shoulders.

A medical exchange says: "A prominent Philadelphia surgeon recently prescribed for a maiden lady, the very pattern of propriety, "Fluid Ext. Rham. Cat. (Rhamnus Catharticus)." She read the prescription, and not only refused to take it, but also said no gentleman would ever write such a thing. The surgeon now prescribes castor oil, pure and simple, and in English—"never did believe in abbreviations anyway."

In his "Indebtedness of Photography to Microscopy," Dr. A. Clifford Mercer sums up his studies as follows:

Photography is apparently somewhat indebted to microscopy for the first fleeting pictures of Wedgwood and Davy, the first methods of producing permanent paper prints, the first offering of paper prints for sale, the first plates engraved after photographs for the purpose of book illustrations, the photographic use of collodion, and, finally, wholly indebted for the origin of the gelatino-bromide process, greatest achievement of them all.

A little more than a year ago it became our duty (a pleasant one, of course), to announce to the world that Dr. J. H. Beebee, of Rochester, an occasional contributor to this journal, was no longer one of us, but two. It now becomes our duty (a pleasant one also), to further amend our original announcement by making him three. It's a girl, hence all bets have been declared off.

A fellow practitioner, who likewise had been fleeced, pulled his muse string in answer to a query as to the whereabouts of the delinquent and his family, with the following result :

Perhaps they're on the railroad,
Perhaps they're on the sea,
Perhaps they've gone to Salt Lake City, mormonites to be ;
Where they stand, or where they lie,
I don't laugh, nor do I cry ;
Whether they're gone to heaven or—well, I don't know, nor can I tell.

" You will recollect, gentlemen, how many times I have told you in the lecture room, that emphysema of the lungs has as its most common cause, the strain to which they are subjected by blowing on wind instruments. Hence it is that members of bands so often suffer from this complaint. Now I am glad to be able to confirm the fact in the clinical ampitheatre, for this patient whom I have brought before you has a well-marked case of emphysema, and he has just told us that he has been a member of a band for more than twenty years. So you see, gentlemen, that illness has no secrets from science."

" What instrument do you play, my man ? "

" I blays der bass drum."

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